Taylor (C. F.)
Dr Joseph Logan of
Atlanta Ga
With the compliments of the
Author

THEORY AND PRACTICE

OF THE

MOVEMENT CURE.

BY

CHARLES F. TAYLOR, M.D.

(130x)

I. Conditions of Nutrition.

Purity of the Blood.

§ 1. Proper corporeal nutrition constitutes perfect health. Passing by those important and interesting processes of digestion, absorption, &c., by nutrition, I refer to those interstitial changes by which the integrity of our tissues is maintained against the destructive agencies of time, and the wear and tear occasioned by those functional activities common to all animal organisms. The conditions necessary for this proper nutrition, seem to be;

First. A right state and composition of the blood, or other nutrient material.* That vital endowment of the cell-structure of every tissue and organ, by which they select from the blood just those materials necessary for their peculiar structures, is the most perfect arrangement by which the blood itself is constantly kept at its greatest purity. The law of Treviranus is, that "Each part of the body, in respect of its nutri-

* Paget.

tion, stands to the whole body in the relation of an excreted substance."* In this sense we may say that the nutrition of any one tissue is a purifier of the blood for the uses of all other tissues. Abundant illustrations of this principle can be seen on a little reflection. The amount of Carbonate of Lime contained in the fluids of an oyster or snail, would seriously interfere with the development of the other tissues of these molusces, were it not elaborated in the form of shell. In those that have no shell, it forms a simple secretion from their fluids, which is washed away by the waters. So of the Carbonates, Phosphates, and other components of animal bone; if they were not selected from the blood in the formation of osseous tissue, but were allowed to remain as a component part of that fluid, they must wholly unfit it for the proper nutrition of other tissues. The same principle must hold good with regard to all tissues, the muscle as well as bone, selecting from the common blood those materials which, remaining, would be inimical to the best development of other structures. This mutual interdependence of function upon function, and organ upon organ, is well illustrated by such organs as the kidneys.

It is said that, if in a healthy man, the secretion from the kidneys be suddenly suspended, he cannot live much beyond seventy hours. In that time the urea that has accumulated in the blood is sufficient to destroy life, by its interference with organic processes. It is true that the kidneys are excreting organs, and that the substance separated by them from the blood has already been used in formative processes, and is now on its downward course towards inorganic compounds; but the process by which this selective separation is performed, is as much a functional act of formative endowment, as the nutrition of muscle or nerve —only the resulting products are different. Even from the partial suspension of any of the nutritive processes—as of the muscular, when an active man is obliged to suspend activity; or of the sanguineous, when a large arterial trunk is tied—there is always more or less disturbance of the system, arising from deterioration of blood from this cause. Every interstitial process,

* Carpenter's Principles of Human Physiology, p. 327. Paget's Surgical Pathology, p. 21.

whether of secretion, excretion, innervation, or new formation, may be called nutrition, for all of these are themselves processes of cell-growth. But the only manner by which any part or organ can be maintained in its integrity, is by the performance of that particular function for which it was specially created. A function itself has reference to all other organs; the *performing* of the function is self-reparative to the organ performing it.

§ 2. Those progressive and regressive* molecular changes occurring in every tissue, simultaneously with every functional act, have relation to the purity and right condition of the blood, not only by selecting from the blood those materials necessary to the proper nutrition of every tissue, thereby preparing a more perfect plasma for other tissue formations, but the blood itself is thus enabled to perfect its own organization. The blood, if not a tissue, is at least an organ, having its own progressive and regressive processes, subject to all the liabilities of other organs, and whose special function it is to carry nutrition to the other tissues, and bring back, for purification or excretion, the general waste. But if tissue transformation take place inadequately, the blood, independent of all other considerations, must deteriorate from sheer want of opportunity to perform its special function, upon the performance of which, as with all other organs, its healthy condition depends. It is tied up, as it were, like a bandaged limb, and languishes for the want of something to do. It has been said that, "when we have the most perfect health, we die the fastest," that is, in the most perfect nutrition, molecular death takes place the most rapidly, in consequence of the great functional activity; all of which, as before stated, are accompanied by progressive and regressive metamorphoses. All these influences upon healthy nutrition, as well as that exercised through the nervous system, which will be considered further on, are entirely independent of the quality of the food and its digestion. The reader will by this time see the importance to the physician of understanding all the conditions under which nutrition or molecular transformation takes place. He will also begin to appreciate how important in disease it is to be able to control these processes in accordance with the indications of the

* Lehmann.

case. That he can exercise control within certain limits, must be apparent, when we reflect that at least *one-half* of the gross weight of the body is muscular and areolar tissue; and from the great supply of blood it is probable, that with ordinary activity, *three-fourths* of the aliment taken into the system goes to supply the voluntary muscular system, over which we have entire control. The amount and direction of muscular nutrition depends entirely upon the amount and direction of the muscular motions which we employ; for every motion is the result of the calling into action of muscular contractility—which is the only function of muscle—with its accompanying formative progressive and regressive changes.

§ 3. But perhaps the most important of all the results of muscular motion is the increased *oxidation* of the tissues, and the consequent increased introduction of oxygen through the lungs. Not that the respiration is necessarily accelerated, but that the *affinity* of the blood for oxygen is increased in the ratio of the tissue metamorphoses, consequent on the muscular contraction. Now, when it is recollected that in *all* diseases the introduction of oxygen is always less than in health—because the transformation of tissue is always less—it will be seen how important a part this increased oxidation must have in the cure of disease. Lehmann says, "There are no acute and but few chronic diseases in which the oxidation of the constituents of the blood is not diminished or impeded;" and again, "There is no disease characterized by too rapid or too sudden oxidation of the blood."* Since oxygen plays an essential part in all vital manifestations, and since all diseases are characterized by a *deficiency* of that element, and since muscular contraction is a function requiring a large supply of oxygen for its manifestation—urea, the result of muscle-oxidation being abundant after muscular exertion—it follows that this presents the proper conditions for the correcting of those states of the system depending on imperfect oxidation of the blood and tissues, by favoring a larger introduction of that element.

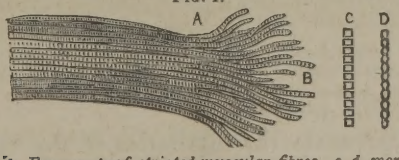
Thus it will be seen that at least as far as the muscular system is concerned, comprising the great mass of all nutrition, we *do*

* Lehmann's Physiological Chemistry, p. 199.

have intimate control of all the molecular transformations. It will be seen by and bye that we can influence the *quality* of those changes as well as their amount and direction. And thus, in so far as the purity of the blood depends on the nutrition of the muscular system, according to the preceding view, we are enabled to exercise a most important and controlling influence.

§ 4. *In the second place*, a proper *circulation* of the nutrient fluids is essential to perfect nutrition. Motion is an essential quality of all organized bodies. Indeed, we cannot conceive of any, even the very lowest organisms, before there are either nerves or special organs of motion, where molecular movements are not only essential to the development and growth, but even the existence of the organism. What is life itself but the capability of specific motions that enables certain elements of matter to assume certain forms? In the lowest forms of animal life this capability of motion or nutrition is entirely confined to cell-endosmosis and exosmosis. It is still the same in the higher orders of animal life, but with the circulation in the vessels superadded. Still, it is estimated that the quantity of the fluids circulating *outside* of the blood-vessels is as great as that within them. The proper circulation of the endosmotic fluids is as important as the proper circulation of the blood in the vessels, and both are indispensable to perfect nutrition. The following cuts from "Peaslee's Human Histology," will sufficiently illustrate the formation of the muscular and elastic tissues, and the blood capillaries, with which we have more particularly at present to deal.

Fig. I.

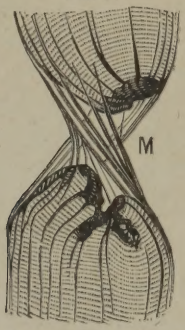


a, b, Fragments of striated muscular fibres. c, d, more highly magnified fibres, detached.

Fig. I. represents fragments of muscular fibre magnified 300 times, showing the fibrillæ detached at the end. (*b.*) More highly magnified fibrillæ are seen detached at *c d*. Without at all entering into histological discussions, it will be recollected that the muscular fibre, like that of all other tissues, is of cell-formation, each fibrilla being a row of cells with its enveloping Myo-

lemma, and that an accumulation of these with their investment, forms the muscular fibre; an aggregation of such fibres constitutes the muscle proper. It will also be recollected that the muscular fibre-cell performs every functional act, whether of contraction or nutrition.

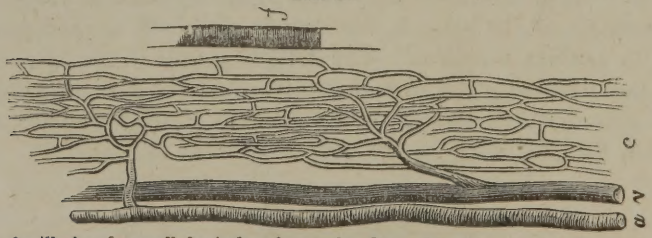
Fig. II.



The Myolemma of torn muscular fibre.

Fig. II. represents the Myolemma, the membranous envelope of the fibre-cells clinging between the fragments of a torn muscular fibre.

Fig. III.



Capillaries of a small fasciculus of muscular fibres, from the neck of the dog. a,) terminal twig of artery; v,) commencing twig of vein; c,) capillaries; f,) single muscular fibre to show the relative size and direction of those to which the capillaries here represented are distributed.

Fig. III. represents the capillaries of the muscular system. The capillaries (Fig. III.) lie between the fibres principally in their longitudinal direction, with numerous frequent communications between them, as shown in the cut. It will be noticed that their arrangement is exceedingly favorable for their contents to be effected by the pressure upon them of the contracting muscle. The lateral expansion of the fibre during contraction encroaches upon the space occupied by the capillaries, forcing

the blood in these vessels forwards towards the veins, the capillary valves rendering a regurgitation towards the arteries impossible.

§ 5. It will be remembered that there is no direct communication between the muscular fibres and the capillaries, but that the nutrition takes place through the walls of the capillary vessel, the myolemma and fibre-cell. Muscular contraction, causing progressive and regressive changes in the fibre-cell, is the incentive for endosmotic and exosmotic action to take place, provided there is the presence of arterial blood in the capillary net-work. For the presence of arterial blood is necessary to the performance of any vital act, and the act is weak or intense according to the purity and the plentiful supply of blood. Paralysis would result as speedily, if it were possible to wholly cut off the supply of blood, as if the nerve were severed that supplied the part with nervous stimuli. We have, therefore, independently of the heart's action, a certain portion of the *circulation* under the control of the will. In corroboration of this statement, let us inquire why it is that a person suddenly sick, though having the same volume of muscle, is obliged, to prevent fainting, to assume the recumbent posture, in order to relieve the heart's labor, made more labored by the stopping, to a certain degree, of the movements of the fluids attending the metamorphoses in the tissues? In such circumstances we are obliged to assume the most favorable conditions, in order that the circulation, unaided—for total suspension would be death—by organic changes, may be kept up.* Those writers who attempt to account for the circulation of the blood, besides the impulse given to it by the heart, by suggesting the "viscidity" of the blood and its "capillary attraction," seem to have overlooked the fact that the variations in the rapidity and quality of the pulse is always in the exact ratio of the disturbance of nutrition, i.e., of molecular motion.

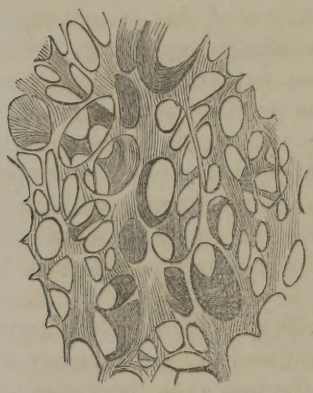
Dr. Neuman mentions the following as bearing upon this point: "Irregular desire for food or drinks, especially the latter, may be caused often in a few minutes by strong movements

* Experiments instituted by the writer on his patients, have revealed the interesting fact that in consumptive patients treated by "movements," the pulse invariably *falls* from five to ten beats per minute, during the hour the treatment occupies, conclusively demonstrating the view in the text.

of the body. This could not arise except from great and rapid changes in the formative processes in the body, which is caused by the movement of the muscles in connection with the general organic movements. Thus the fluids of the body must become rapidly diminished, because the exhalation through the lungs and skin and the external and internal capillary net-work is increased, and because at the same time a great quantity of the fluids have been changed into solids." We are, therefore, to conclude that the circulation, both within and without the vessels, is very sensibly influenced by the nutrition and its accompanying molecular movements in the substance of the tissues.

§ 6. There is another tissue, which, though generally minutely described by anatomists, is often practically overlooked by physiologists. The *areolar* tissue of modern authors is here alluded to. Fig. IV. gives a good illustration of the structure of this tissue.

FIG. IV.



Portion of areolar tissue inflated and dried, showing the general character of its larger meshes. Each lamina and filament here represented contains numerous smaller ones matted together by the mode of preparation.

The areola is the true investing and connective tissue. It isolates the various organs, dipping down between them and supporting them. It accompanies the veins, arteries, and even surrounds the capillaries, and often the nerves also. "Indeed, it enters to such an extent into every part and organ, that if all the other tissues were entirely removed from the body, its conformation would still be preserved in every part by the areolar tissue; and except from the removal of the osseous and muscular tissues, its weight would be but slightly diminished." "It invests the muscles and gives off prolongations investing the fasciculi of the fibres." * This tissue is capable, by its relaxation or retraction, of causing *mechanical* variations in the *capillary* circulation, and of other fluids generally, and in this way seriously interfering with nutrition; thus affording the

* Peaslee.

basis of several pathological conditions, to be considered hereafter.

§ 7. The *third* point to consider, is the influence of the *nervous* system upon the nutritive processes.

Vegetative life is common to all organized beings, but in the higher orders this vegetative life has superimposed upon it, the dynamic or animal life, whose medium is the nervous system. The animal life furnishes the conditions for the vegetative life to operate in. In other words, while the cell-formations take place by virtue of their own endowments, the nervous system controls many of the conditions under which this inherent plastic power must operate. Through the influence of the nervous system, there is kept up the most complete inter-relations of part to part, organ to organ, and function to function. The cerebral, sensitive, motor and sympathetic have actual fibrillated connections and mutual dependence, so that it is impossible to influence one without influencing in some measure all the rest. The nervous system is a republic, delegating, it is true, certain duties to each member, but never giving up the dependence of each part upon the whole body politic. Every action of one engages the attention of all the rest. It is the duty of the physician to see that these actions are in harmony one with another, and not discordant.

§ 8. Doctor Marshall Hall's doctrine of the *reflex* action of the cerebro-spinal system, explains many of the phenomena of nutrition, and by the Movement Cure is made of practical use in medicine. The idea of reflex action, of afferent and efferent nerves is something more than a mere abstraction, or even than a well-established, but simply curious and interesting matter of physiology. It is a matter of precise gunnery—a means of hitting the mark without round-a-bout or doubt, and of producing in a given part or organ just those conditions of nutrition required to promote a right instead of a wrong functional manifestation. What can be more plain? To act upon it we have only to patiently investigate the laws under which these manifestations of the nervous system take place.

It has been long known that the *irritation* of the sensitive loops of an afferent nerve will produce a similar irritation (pathological) in the organ upon which the efferent nerve is distri-

buted. Such, for instance, as the production of vomiting by tickling the throat; uterine contractions by irritating the breasts, &c. But while physicians have followed the *pathological* manifestations of the law by the use of the whole batch of counter-irritants, both internal and external, they have entirely ignored its *physiological* manifestation. It surely is much more philosophical practice and the only one consistent with the well-established doctrine of physiology here alluded to, to cause a *healthy*, instead of a diseased condition in the region of the afferent nerves, if we would produce a healthy manifestation in the organ to which the efferent nerves are distributed. (See § 20.)

§ 9. The special influence of the mind and will upon the general bodily nutrition, is daily manifested and acknowledged by every physician. "The patient must keep up his hope," says the doctor; "He must have confidence in me, or my efforts will be unavailing," says another, and so on. Hope to the sick man brings life and health; despair to the well man brings disease and death. Each mental manifestation has not only its natural language of position and motions peculiar to itself and different from all others, (thus effecting of course the nutrition of the muscular tissue employed,) but there is always more or less disturbance of other functions with their corresponding change of organic processes. When luscious fruits are presented to the eye, we not only reach forth the hand to receive them, but the "mouth waters"—the salivary glands pour out their secretion. Bad news impairs the appetite and the secretion of gastric juice; while good news increases both. Melancholy destroys the action of the bowels, causing constipation; while sudden apprehension often causes a cathartic effect.* Fear acts upon the skin, causing a "cold sweat" to bedew its surface. Sympathy, contrition, grief, produce tears, and so on. Now, all this indicates that there may be a *Medical Psychology;* that, as both general and local variations of the formative processes take place in accordance with mental manifestations, so these manifestations may be so *directed* as to control nutrition for special pur-

* The writer knows a lady, who, though an excellent specimen of health, regular in all respects, yet fifteen minutes of anxiety for her husband or child produces a violent purging, six or eight times in an hour, and till the anxiety is removed.

poses. For instance, it is easy to conceive that a muscular contraction under the influence of *volition*, would be *different* and *more* than muscular contraction produced by reflex action. If now, a movement is made for a special purpose, with pre-determination and precision, the muscular contraction advancing slowly and uniformly, that the nutrition of the muscular tissue is effected by the contraction, every one knows; but is not the steady, unvarying direction of *volition* upon it for promoting a special functional manifestation particularly favorable to its *proper* performance? When a patient *feels* that his exercises are doing him good, no one can doubt that he is peculiarly fitted to receive good from them; then why not, if he can be made to feel that his *special* movements are calculated to remove his special ailments, allow that they have a similar effect? There is no doubt but that the effect of all modes of treatment is much influenced by what is here termed the "medical psychology." This view may account for the wonderful results produced, generally among ignorant and superstitious people, by various means wholly absurd and inefficient in themselves, such as the laying on of hands over diseased parts, incantations, &c., but if we are to believe evidence, with all due allowance for exaggeration, producing often manifest *results*.* We have then to study the influence of mental states upon general and special nutrition, and direct our treatment accordingly.

§ 10. The law of the expenditure of nerve force seems to be that it is in the ratio of its *intensity*. In other words, fatigue seems to be caused in the ratio of the *effort* made, without reference to the amount of contractions in the muscles, at least till a certain point is reached. For instance, a certain number of steps can be taken in walking with perfect ease, which it would be wholly impossible to take running. And so of all our voluntary movements. But *habit* may in part supersede volition—where dexterity is acquired—in which case the movements are automatic, the spinal cord presiding over them, where there is very little comparative fatigue. Again, movements directed by another,

* This view has nothing to do with the truths or errors of "Mesmerism." Indeed, Mesmerism, what there is of it, seems altogether too ill-defined and uncontrollable for practical direction, at least till some genius shall arise to place it on a more strictly scientific basis.

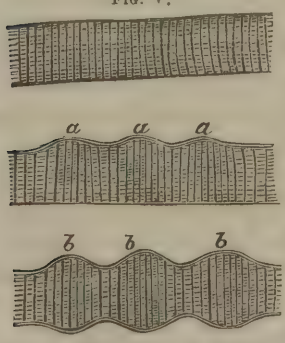
prevent so large an expenditure of nerve force, requiring slight volitionary effort.

§ 11. Thus some of the most important conditions of nutrition have been barely hinted at; to do more would be to reproduce the whole of physiology. Modern physiological science so generally treated of in the books, and regarded by medical men as simply curious and interesting subjects for the student, but having little relation to the purely experimental and empirical systems of medicine, is by the Movement Cure made the basis of an exact science of healing.

II. Muscular Contraction.

§ 12. Muscular contraction depends upon the primary fact that muscular fibre, under appropriate stimuli, shortens itself. This shortening of fibre under stimulus is the result of the shortening of the fibre-cells in length, and their corresponding increase in diameter. But it must not be inferred that this action takes place in the whole muscle, or even in the whole length of any one fibre, at the same moment of time. "Different portions of the length of the fibre assume this condition at different moments, and hence the whole structure is thrown into a form which recalls the motion of a worm." The different degrees of energy with which a muscle contracts do not depend so much upon the energy with which the fibre-cells contract, as upon the *number brought into action at one time.**

Fig. V.



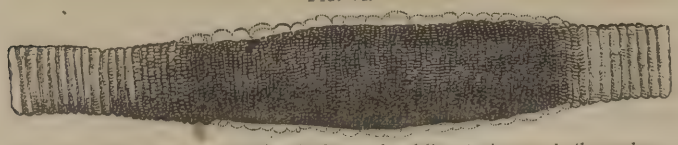
Muscular fibre previous to and in successive stages of contraction, showing that only a part of the fibre is in action at one time.

Fig. V. represents stages of contraction seen in the skate. The uppermost figure shows the state previous to the commencement of active contraction. *a a a*, successive "waves" of contraction seen moving along one margin of the fibre, marked by bulging of the fibre, on approximation of the transverse stripes, and a consequent darkening of the spots. *b b b*, similar "waves" still moving along the fibre, but engaging its whole thickness.†

* Draper's Physiology, p. 439. † Peaslee's Human Histology.

Fig VI. is a muscular fibre of the Dytiscus, contracted at its centre, with the myolemma raised on the surface.

Fig. VI.



Muscular fibre contracting; the length shortened and diameter increased; the myolemma raised in bullæ on the surface.

Dr. Draper* has very clearly shown that muscular contraction is the *result* rather than the cause of muscular waste; that the *oxidation* in the cells caused by a stimulus occasions an actual waste—the waste matters passing by exosmosis into the venous capillaries—and that the *contraction* is the mechanical result; supply and repair taking place immediately from the arterial blood. But it is sufficient for us to know that actual loss of tissue takes place with every muscular contraction, which is immediately supplied from the blood by the plastic power of the fibre-cells themselves. But this repair is not immediately perfected, and hence we spend at least one-third of our lives in the total unconsciousness and inactivity of sleep, that the reparative process may be completed for the activities of each succeeding day.

§ 13. It is evident that to produce the greatest change in the nutrition of muscle, the contraction must be very slowly performed, in order to allow time for the successive "waves" of contractions (see Fig. V.,) to be propagated along the whole length of the fibre—as it occupies the same spot only a moment at a time—or resistance should be opposed so as to bring a larger number of the fibres into action at the same moment to overcome it; or still better, both the slow and the resisted movement should be employed. It can readily be seen that such a contraction would effect an almost infinitely greater part of the muscle, and besides it would be but a slight expenditure of nerve force, for (§ 10) nervous exhaustion is in the ratio of the intensity of its action, and in such a movement it would have very little intensity.

---

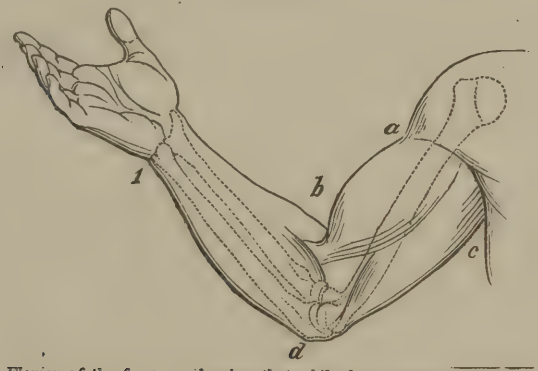
* Draper's Physiology, p. 446.

III. CONCENTRIC CONTRACTION AND EXCENTRIC CONTRACTION.

§ 14. From the construction and arrangement of muscular fibre, (Fig. I.,) the arrangement of the capillaries, (Fig. III.,) and the method of contracting, (Figs. V., VI.,) it will be seen that with every contraction there is also a *mechanical* effect within that tissue itself; the capillaries are mechanically *pressed* upon, driving the blood along into the *venous* capillaries, and ultimately into the veins; at the same time all the fluids, from the pressure, more or less change places. (§ 4.) This mechanical effect of propelling the venous blood forwards by muscular contraction, can be well enough seen by seizing the arm just above the elbow with one hand, so as to stop the return of blood in the large veins, and contracting the muscles of the fore arm; the superficial veins will immediately be filled.

§ 15. But while this effect is taking place in the contracting muscle during a movement, its antagonist is placed in just the opposite state, i.e., it is being *drawn out*, and its capillary network relieved from pressure.

FIG. VII.

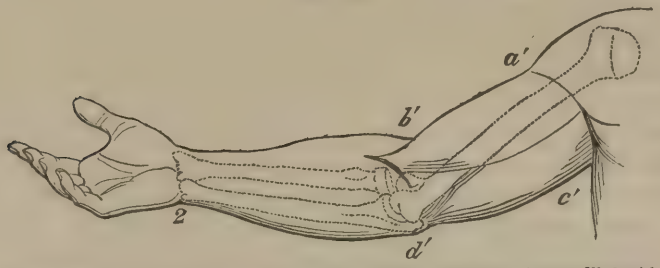


Flexion of the forearm, showing that while the contracting muscle a b shortens itself, its antagonist c d is drawn out longer, illustrating that while the pressure of contracting in a b forces the fluids into the venous *capillaries, the relief from pressure in c d allows* arterial *blood to flow into the capillaries.*

Figs. VII. and VIII., which are representations of the flexion and extension of the fore arm, will convey a clear idea of the different relative states of the flexors and extensors in every movement. Suppose *a b* to be the biceps flexor, and *c d* the triceps extensor of the fore-arm. Now when the arm is motionless,

the relative condition of both muscles is exactly alike. But if the fore-arm be moved from 1 to 2, it is done by the contraction

Fig. VIII.



Extension of the fore-arm, showing that a' b' previously shortened, is now filled with arterial blood by being drawn out and its capillaries relieved from pressure, while c' d', by its contraction and consequent pressure, passes its previously accumulated blood into the venous capillaries.

of *c' d'*, but *a b* is by no means passive, but contracts constantly—or the movement would be made by a sudden jerk—only *c' d'* contracts just enough more than *a b* to overcome it; meantime *c d* is shortened from *d* to *d'*, and *a b* is lengthened from *b* to *b'*. Therefore the contraction in *c' d'* is called "concentric," because that muscle shortens itself, and the contraction in *a b* is properly called "*ex*centric," because it is drawn out longer while attempting to contract itself.

§ 16. Now while the "concentric" contraction in *c' d'* is going on, and as we have seen (§ 14) with the effect of driving the fluids along towards the veins, the "excentric" contraction in *a b*, by the muscle being actually *drawn out* by the superior force of the antagonist muscle, (*c' d'*,) the capillary net-work in *a b* is *relieved* from pressure and there is no hindrance to the influx of blood or other fluids. But blood cannot *return* from the *venous* capillaries on account of the valves, and hence must flow in through the *arterial* capillaries, especially since the contraction itself creates a physiological demand for arterial blood. (§ 5.)

§ 17. In the ordinary flexions and extensions in the use of the muscles, the combined influence of the concentric and excentric contractions is to promote the normal circulation and nutrition of the muscles employed. But suppose that in moving the arm (Figs. VII., VIII.,) from 1 to 2, *resistance* be applied at the hand, then *a b* will not contract during the movement, for its op-

posing force is already supplied by the resistance from without, and though drawn out, it remains relaxed and flabby during the movement, having neither the physiological nor mechanical condition for the influx of arterial blood. Hence we have *isolated* the effect of the movement upon the single extensor muscle *c' d'*. Again, suppose that *force* is applied at the hand, and *a b* is *drawn out* by that force instead of the contraction of *c' d'*, then in that case the extensor muscle *c d* will not contract, its *force* being supplied from without, and it will possess neither the physiological nor the mechanical condition for propelling forwards the venous circulation, but will remain entirely inactive. Hence the only result of the movement is the excentric contraction of *a b* with its influx of arterial blood, which effect is therefore also isolated. Furthermore it is very clear that if the movement were made with *resistance* both ways, from 1 to 2 and from 2 to 1, the contraction would be first concentric in *c d* and then also concentric in *a b*, without any excentric contraction being employed. Or, if *force* be used to move from 1 to 2, then *a b* will be excentric, and if *force* be also used to move from 2 to 1, then *c d* will also be excentric, and there will be no *con*centric effect of the combined movements. The reader is requested to study carefully the preceding cuts (Figs. VII., VIII.,) and explanations, because much of the efficiency of the treatment by movements depends upon thoroughly understanding these principles.

§ 18. But it should be always borne in mind that to secure the best results upon local or general nutrition, the muscular effort should never be carried too far—never to approach exhaustion—for in that case a certain amount of the plastic power of the fibre-cells is also exhausted, which destroys the effect sought to be produced. After the required impression has been produced upon a part with sufficient perseverance or intensity to incite its proper healthful functional activity, the impression should cease before there is a chance for reaction to follow, and all the progressive and regressive changes are taking and can continue to take place in the most perfect and vigorous manner. It is not the amount but the *quality* of these changes that insures the most perfect nutrition.

IV. Retraction and Relaxation.

§ 19. It has been previously stated (§ 4,) that in health the ingress and egress of the fluids in the tissues are the same. That is, the circulation in the arterial and venous capillaries, and the passing in and passing out of the fluids through the cell-walls, the myolemma and the areolar tissues maintain a constant equilibrium. But when defective nutrition or disease has impaired the chemical qualities of the fluids, so that the proper alkalinity and other conditions necessary to secure the proper affinities of the nutrient and other fluids are out of proportion, or if the cell-walls, the myolemma and other tissues from their vital or mechanical conditions, do not afford the normal conditions for proper endosmotic and exosmotic interchange of fluids, then there must necessarily arise one of two conditions, viz: either endosmosis must exceed exosmosis, or the latter must exceed the former. If it be the former, that is, if more fluids pass into the cells of the tissues than pass out, then there arises a retardation or stagnation of this endosmotic and exosmotic circulation, the cell-membranes become expanded, thinner and more feeble in their vital endowments, the myolemma, the areolar and other tissues partake of the same characteristics, and the *venous* capillaries are less able to carry forward the general waste resulting from the feeble progressive and regressive changes. This condition constitutes a condition of relaxation. But suppose, on the other hand, that the affinity of the fluids within the cell- and other membranes, is greater to pass *out* through the membranes than for the nutrient fluids to pass in, then in that case exosmosis will exceed endosmosis; the cell- and other membranes become contracted, thicker, harder, and present both physiological and mechanical impediments to the circulation in the *arterial* capillaries. Such a tissue presents a condition of retraction. A retracted muscle is shorter, smaller and harder than in the healthy state, and differs entirely from the *con*traction of healthy muscular fibre. In contraction the muscle swells in the middle, while the tendons at the origin and insertion lie buried deep in the parts, and relaxation speedily ensues. But in retraction the muscle does not swell in the middle, but seems to rise up out of the tissues like a cord during its whole length. This condition of retraction exists in all stages,

from slightly feeble nutrition to complete atrophy. A muscle in a state of relaxation is longer, larger, softer, more feeble, and is entirely without that tonic firmness characteristic of healthy muscle when not in active contraction. This condition may also exist in all stages, from simple feebleness to actual paralysis.

§ 20. Now it is believed, and in most cases it can be demonstrated, that this condition of retraction or relaxation—i.e., of disproportion of endosmotic and exosmotic circulation, and consequent disproportion of the arterial or venous capillary circulation—exists in *all* tissues in all forms of chronic disease. This being the case, to correct this condition of retraction or relaxation in the tissues where it exists, would, all other things being equal, present the conditions for proper nutrition and restoration to health. By reference to part IV., (§ 15, Figs. 7, 8,) it will be seen that the excentric and concentric movements supply precisely the conditions for remedying the physiological and mechanical impediments to healthful nutrition in both the retracted and relaxed conditions of the tissues; the *excentric* movements producing a more perfect supply of *arterial* blood and consequent effusions of organizable plasma; and the CONCENTRIC movements accelerating the egress of the fluids from the tissues to the venous capillaries and veins. This is very apparent, so far as the muscular system is concerned, which, by acting on the various levers of the body, can be put in the desired positions. But the application of this principle is not only to derangements of the muscular system, or even to the general effects upon the quality of the nutrient fluids, as explained in the first part of this chapter, but even the organs of the viscera can be acted on by mechanical means to promote their healthful nutrition in accordance with their pathological states. All organs have their *mechanical* stimuli, and not less so because they may not be contractile tissue or muscle. For instance, a kneading of the relaxed abdomen would affect its contents differently from kneading the expanded abdomen; or a vibration of the chest and lungs in a stooping contracted position would affect those organs opposite from a vibration of the expanded chest, with the hands stretched up over the head. In fact, the first movements mentioned in each case would be appropriate for a condition of *relaxation* of the parts, and the second would be

useful to correct a *retracted* state. (§ 21.) But there is still another very important consideration to remember. In all cases of disease of internal organs there is secondarily produced a similar condition in the muscular tissues adjacent or containing those organs affected. For instance, in consumption where there is a retracted state of the parenchyma of the lungs, there is always a shrunken condition of the chest; the muscles are thin and hard, and their appearance is so characteristic, that all physicians understand the outward appearance of the chest as indicating the condition of the organs within. So in constipation, the muscular coverings of the abdomen are hard and unyielding, tympanitic if there be flatus, and present the usual appearance of retracted tissues, which is the condition of the intestines beneath; while in chronic diarrhœa, which is a relaxed condition of the abdominal organs, the muscular coverings are also relaxed and flabby. The importance of these facts cannot be over-estimated, for, by producing in the coverings the condition indicated by the pathological condition of the visceral organ, aside from direct mechanical effect in the organ itself, there is also a *secondary* effect in turn in the organ beneath, in consequence of the primary condition produced in the muscular coverings. Thus, if in constipation, movements be given which expand the abdomen —i.e., excentric movements—the contents of the abdomen must also be expanded, which would of itself promote a better arterial circulation and consequent nutrition in them; but at the same time, while an arterial condition is produced in the retracted abdominal muscular coverings, the same condition would be *secondarily* produced in the abdominal contents, on the same principle that the muscles were retracted in the first place by the retracted condition of the abdominal organs. The same idea has been carried out in a very crude way, from the earliest periods of medicine, by the use of issues, setons, plasters, blisters, &c., *over* a visceral organ—as the lungs for instance—for the purpose of producing an impression in an organ having no *direct* connection with the part irritated. Of course, to those who aim to act in strict accordance with physiological laws, such a perversion of healthful nutrition on the surface must have very questionable utility in causing healthful nutrition in the organs beneath. It seems to be a law, whose constant operation is se-

cured through the intimate connection of the blood-vessels, lymphatics, &c., as well as the influence of the nervous system, that a perfectly healthy organ cannot exist in juxtaposition with a diseased one. And on the other hand, it is equally true, that to cause a healthy nutrition in an organ near a diseased one, is to secure a more perfect nutrition in the diseased organ itself. For instance, in caries of the spine, instead of destroying the tone of the spinal muscles by braces and pads, pressing on the point of disease, those muscles should, by every possible means, be kept in the highest vigor and most perfect nutrition they are capable of, not only for their effect as the natural and only proper support of the spinal column, but as the direct means of causing a healthy nutrition, instead of the ulcerative process in the bones beneath.

§ 21. Thus it will be seen that the various movements of the body, both voluntary and involuntary, though not of service in every case of disease—perhaps in no case of *acute* disease—can be so controlled and directed as to secure very many of the conditions of proper nutrition or health. The healthful quality and purity of the blood; its proper and equal distribution; the just and unperturbed influence of the nervous system; and general and normal nutrition in all the tissues of the body can be secured. So also the special correction of special conditions unfavorable to right nutrition in different parts, in accordance with the nature of the pathological states, whether of external or internal organs, whether of the muscular or involuntary system, can also be effected by appropriate movements. All this in connection with or without any other medical means, as the indications of the case may require. The application of the principles of the Movement Cure to special cases will be illustrated in succeeding parts.

GENERAL VIEW OF EXERCISE.

§ 22. In order to fully comprehend the special medical uses of bodily movements, it will be necessary first, to consider the *physiology of exercise in general.*

It is generally supposed, that exercise affects only the muscular tissue, but such is not the case, for movements with muscle alone would be impossible except in a few insignificant instances. Every movement requires not only the muscles engaged, but also every other part of the organ moved—vessels, tendons, ligaments and bone. It is not the *muscle* alone, but the *limb*, for example, that moves. And if development is the result, the muscular tissue receives *only its share* of such development. It is just as necessary to the development of *bone* that it should perform *its* part in the exercise—that is, to sustain the muscles, their origins and insertions—as it is for the muscles to perform their part in the movement of the member. It can be easily seen that the bones and all other tissues besides the muscular are necessary to the perfect action of the leg, for instance, and that the development of all these tissues are as much dependent on and effected by the exercise which all are employed in making, as any one tissue. But this is equally true of every other part of the body; the trunk as well as the extremities. The muscles of the chest, for instance, cannot act independently of the lungs beneath them, but taking the thorax *as a whole*, the lungs form a part of that apparatus, and the force, direction and perfection of all motions of that part of the trunk depend directly on the condition of the thoracic contents. And every movement implicates the lungs, heart, &c., *as a part of the motor apparatus;* and the result of the movement, whether it be development or exhaustion, embraces the contents of the chest as well as the bones, ligaments, muscles, &c., for the reason already given that the contents were necessary to the movement.

We move in general exercise not the muscles of the body alone, but the body *as a whole*, and hence the nature of the exercise we take affects us as a unit. This is plainly seen in the physical characteristics, anatomical conformations, peculiar diseases, and even marked intellectual and moral distinctions in different classes of men, according to their trades and avoca-

tions, amusements and recreations. It is admitted that sedentary people need systematic exercise, but it is a great mistake to suppose that the laboring man does not also need it. He needs physical training, perhaps, to undo the injurious effects of his occupation. As we do not trust to the spontaneous development of the mind, but aid its growth by suitable mental gymnastics, called systematic education, neither should we allow the body to take its choice of proper or improper development. Professor Regius has in his ethnological cabinet many specimens that show the influence of occupation on nutrition. "A person who for a trifling transient lameness took up the occupation of begging, sat at the end of a bridge receiving alms the rest of his life. The favored limb was used as little as possible. The thigh bone of this limb is nearly three-quarters of an inch less in circumference than the other, and more than one inch shorter. A criminal who was confined by a chain attached to one ankle for five years, died by frost in making his escape; although the bone of the unused limb had not materially changed its size, it feels as light as pine wood. An old lady sat knitting in the alms-house the last years of her life; the ribs were so pressed together that the transverse diameter of the chest was only five inches, and the pelvic bones were inclined backwards in a direction opposite the healthy position, so that it was only nine inches from the top of the sternum to the pelvis. The chest of one who has died of consumption, generally measures three or four inches over the ribs less than that of a person who has died of any other disease. The vertebræ of a carpenter or of any one who has followed any similar occupation, are shown here by numerous examples to be not only larger but heavier in proportion to size than those of a shoemaker or tailor."* Now the faulty nutrition induced by occupations, or by any course of life approaching the civilized, should be counteracted by art, so that a harmonious development may be possible for all, in *spite* of evil tendencies. The too laborious farmer or mechanic should be softened down, while the too sedentary people of the towns should be hardened up to the proper standard. The only use of exercises is not, as is generally supposed, to increase the quantity of muscle or other tissues—for *excessive* exercise may decrease both, (§ 18)—but different kinds and qualities of exercise

* Dr. Geo. H. Taylor's letters from Sweden.

are capable of making very different and distinct impressions upon the system, according to their nature.

§ 23. Exercise, as previously shown, has an intimate connection with the general nutrition, but it has an equally profound influence upon, and can and does control the manifestation of the nervous system also. The amount of nerve-force possessed by any individual may be considered as the measure of that in dividual's capacity. This capacity may be divided into the two great manifestations of sensation and volition, i.e., what we *experience* and what we *do*. In perfect health, where every functional manifestation is reciprocally well-balanced, the sensations, or the capacity *to receive* impressions, and the volitionary force, or the capacity *to make* impressions, are equal. But each of these manifestations of the functions of the nervous system is capable of cultivation. Indeed, this cultivation is the essence of civilization, and to be perfect, needs only to be harmonious. The reciprocal relations of sensation and volition may be illustrated by comparing the nerve-force, or individual capacity, to a river of definite size, but separated into two streams of equal dimensions by an island at its mouth. Now, if by any means the channel on one side of the island becomes widened and deepened, of course more water will run through it, and therefore *less* water will be left to flow through the other channel. Now if one channel is called sensation, and the other volition, the illustration is perfect. Excessive sensational capacity precludes excessive volition or force, and so on the other hand, great muscular force is not joined to great sensitiveness to outward impressions. By great and small I refer to the standard of the individual, for what might be much for one, might be little for another. Now as we would lessen the larger stream by increasing the smaller one, in the illustration, so we may lessen the capacity for sensations by cultivating volition; or to speak to the practical point, our ability to be affected by impressions is within certain limits, in the inverse ratio of the cultivation of our muscles. Your fine lady, reared on sweetmeats, educated at a boarding-school with all the "accomplishments," every sense gratified, arrives at a point where a breath of wind gives her a cold, she feels the changes in the weather like a barometer, and is really capable of making only the slightest exertion of volition, even to help herself to the ordinary necessities of life

without inconvenient physiological disturbances, and perhaps pathological consequences. A slight injury or transient illness prostrates her, not with imagined, but with actual suffering; while Bridget in the kitchen, who has been accustomed to *execute* rather than to *feel*, breaks her arm and walks about without inconvenience until it is healed. Extremes are always pernicious. The savage with a complete animal nature, lacks the cultivated intellect and perceptions to direct his brute force into useful channels, and civilization loses much of its nobleness by pandering to appetites and sensations, while the noblest resolves fall to the ground because there is no power to execute!

§ 24. It is easy to see the practical bearing of the foregoing. Properly adapted exercises will not only correct the vicious tendency of certain occupations by their counteracting influence—elevating the lower classes of society by increasing their means of enjoyment, and making them more impressible—but will diminish suffering and give executive ability, character and force to the more refined. The exercises for the first class, to give flexibility to muscle, to increase the higher sensations, should be light and active, such as games, sports, dances, and those generally requiring more agility than force. While those exercises for developing volition and power, and diminishing morbid excitability of the nervous system, should be slow, uniform, easily executed, non-exhausting movements, and those requiring a certain *continuance* of action. In a word, such as will act on the muscles by their continuance and force, rather than on the nerve-centres by their intensity. And as we have seen (§ 10.) that the effect of every movement upon (i.e., changes produced in) the tissues, is in the ratio of its continuance, and that the effect upon the nerve-centres is in the ratio of the effort made to accomplish the movement, we have then an unerring guide as to the *character* of the exercises that it is proper for different classes of people, or for invalids to take.

§ 25. As the necessities of labor are compulsory, (fortunately) there is no escape from the conditions attending it; we can only enjoy the good, and remedy, so far as possible, the evils attending the forced exercise; but in *voluntary* exercise we should always have a general purpose in view, of which the various bodily movements are only the means to accomplish an end. Unfortunately, gymnastics have been considered as certain contor-

tions *to be done*, instead of certain physiological impressions to be made by means of movements. It has been considered, for instance, that to strike the back of the hands together behind the back at the height of the shoulders, was a feat worth striving for; whereas the *development* resulting from such a movement would be much less than if the arms were carried only just back of a line parallel with the shoulders. Indeed, if a person be so loose-jointed as to contort himself thus, that would be sufficient reason why he aught never to do it, till he has developed himself by proper exercises up to the point that his muscles, tendons and ligaments hold his joints so firmly together that such a contortion would be impossible. But the details of gymnastics are foreign to the object of this work, but only those physiological principles relating to exercise in general will be considered here.

§ 26. But when exercise in any form is taken to secure tissue-transformation and growth, there are two considerations that should never be lost sight of. While in perfect health it undoubtedly happens that the greatest amount of tissue-metamorphosis occurs at the moment when the nerve-centres give warning by weariness, that a similar condition has taken place in them, yet in civic life it much more frequently happens that the best results of the exercise has taken place long before there is any sense of weariness, in which case further exercise destroys more or less the good already accomplished. Or, on the other hand, and as always happens in feeble persons, there is weariness so soon that there has been comparatively little change wrought in the tissues. In the first case, as with literary people, school girls, or where there have been previously large draughts made upon the nervous system, the exercises should never be pushed too far; while in the second case, the exercises should be of such a nature as to call out but very little nerve-force, thus making the greatest impression upon the tissues with the least waste of innervation. This latter idea will be further illustrated when I come to speak of the treatment of those diseases attended by great depression of the nervous system, because it is one of the essential qualities of the Movement Cure that exercise can be taken without fatigue. (See hysteria, chorea, &c.) And as exercise may be taken without fatigue, so

also there may be fatigue without exercise. And with weakly persons, where there is debility and the accompanying irritability of the nervous system, improper exercise may do harm by inducing fatigue without a corresponding impression on the tissues. As a general thing, people in ill health ought not to be required to exercise to weariness, because sickness implies, generally, a certain depression of the nervous system, which should not be increased; but if it is necessary to make still deeper impression upon the muscular system, (§ 22,) then the medical uses of bodily movements, to be explained hereafter, will be found necessary. Free exercise would then not be sufficient, but the patient would require appropriate (Movement Cure) treatment to answer the indications. But it may happen, in some instances, that it is the functions of the nervous system mainly that need to be called out and exercised as the principal means of affecting the organism. When this is done in such a manner as to develop the function acted through, so as to produce harmony between it and other manifestations, nothing could be more proper. When the will-power is feeble from nonuse merely, whether or not accompanied with certain phases of hypochondria, then fatigue will be a strengthening instead of exhaustive process, independent of the general physiological effect of the exercise. But nothing is more promotive of mischief than the general indiscriminate recommendation of physicians to their patients to "take exercise," without any instruction as to kind, quality or manner of taking it. Even the free exercises of invalids should always be in accordance with the *indications*. There is a method of medical practice by acting through the nerves of *sensation*, which though not connected with the subject under discussion, may yet be referred to here as illustrating the general idea. The *Water Cure* system effects and to a certain extent controls the general nutrition through the nerves of sensation, by variations of temperature by means of water upon the external surface of the body. Starting upon the fact that we exist in a perpetual bath—generally colder than the blood—and that the calorifacient function finds thus its normal stimulus, under certain circumstances, artificial variations are produced either upon the whole or any portion of the surface of the body for the purpose of increasing the introduction of oxygen, by means of respiration, to supply the heat taken

away by the cold, with the corresponding control of the direction of the circulation, and the increased depurating effect of the increased oxydation. With proper knowledge, and guided by certain principles, this may be a strictly scientific treatment. But too severe or too great persistence in these applications is apt to place the system in subservience to these sensational impressions, at the expense of volition and the general disturbance of every manifestation of the nervous system, and even to the production of pathological states. So also certain conditions entirely contra-indicate these applications, though with proper discrimination the water-cure-processes are very efficacious.*

§ 27. As a deduction from what has before been said, it should be remarked that while *habit*—implying the presidence of the spinal cord instead of volition over the movement—allows a much greater amount to be taken without fatigue than could be endured at first; it also should be recollected that all sudden, indefinite, unexpected movements require a vast expenditure of nerve-force. A short succession of sudden trips, or missteps, or blunders, will speedily exhaust even the strongest man. And there is no doubt but that the present style of long skirts for ladies dresses, requiring as it does constant, uncertain, often unsuccessful efforts to snatch the skirt away from the advancing feet to keep them from tripping; the getting into stages and ascending stairs in crouching, unsteady attitudes, holding up the dress meantime, and all similar spasmodic efforts, require such a fearful expenditure of nerve-force that it is, of itself, sufficient in many cases to bring on a train of the most distressing symptoms. Indeed, the whole subject of dress, in all its influence upon bodily movements, requires consideration. Any style of dress is faulty that confines or impedes ever so slightly the simplest movement. It is not enough that the movement may be made with comparative ease and in the most perfect manner, but it must be perfectly free, else there will be next time an instinctive reluctance to perform it, or shrinking from it, involving other parts not necessary to the original motion with a corres-

* But it is not necessary to always employ the water-bath. Feeble patients get great benefit from the *air*-bath, denuding themselves and walking about the room; but all the clothing must be off, else currents will be formed of unequal temperatures.

ponding loss of power. But still worse; by persistence, this false action becomes a permanent habit; for instance, the slight impediment to the movements of the arms, especially the upward movement, occasioned by some styles of dresses, is injurious, not so much from the actual resistance of the dress to the action of the deltoid and other elevator muscles, as the resistance, though trifling, being persistent, it causes an equally persistent shrinking away from the point of expected resistance. This style of dress, especially for females—they having fewer counteracting influences—constantly tends to produce narrow and shrunken chests, depression of the diaphragm, falling of the bowels and injury to the pelvic organs, besides general debility from imperfect respiration.

The pernicious effects of tight-lacing need not be argued here. But what *is* tight-lacing? for no lady admits that she laces tight, and many honestly deny it who still are daily suffering from its evil influences. When viewed from the foregoing remarks on impeded motion, and the tendency of parts to recede from persistent resistance, it follows that a very slight resistance to the action of the respiratory muscles—a resistance falling far short of actual compression of the chest—must be extremely harmful, harmful to a degree not often contemplated even by the medical man. The fastening of tight cords or bands about the waist to sustain gentlemen's pants or ladies skirts, is injurious from two causes, viz.: the soft parts of the loins and abdomen are easily compressible, infringing upon and displacing the organs beneath, and interfering with their functions as well as with muscular motions; but if possible, still more deleterious is the weight imposed. The diaphragm is dragged downwards, followed by the lungs, and the abdominal contents are forced down into the pelvis. This is more especially true in females, because of the larger abdomen and pelvis and less power of resistance in the muscles and other tissues, and fewer opportunities to counteract by exercise the weakening effects of such malpositions of organs, than in males. The fashion of wearing very long, especially pointed waists, that obtained a few years ago, and is liable at any time to be re-introduced, is no doubt the cause of much of the present female suffering. The abdominal organs, by such a dress are forced low down and fixed there so permanently, that ladies have often remarked that they

"could make themselves long-waisted" by persevering in that style of dress. Stays, though more perfectly fitting the form, passing far down as they do over the abdomen, must press upon it with great force from their stiffness, in all forward flexions of the trunk, which together with having the objections of long waists, more than counteracts all the fancied relief said to be afforded by sustaining the skirts.* But there is another still more serious objection to stays, from the *support* they give to the upper part of the trunk, thus weakening the muscles which alone are competent to hold the form properly erect. Even if the muscles cannot sustain the trunk without too much fatigue, there cannot be anything gained by holding them up ever so slightly by support. Fatigue indicates *rest*, and not *assistance*. It would be better for the patient to lie down part of the time, with the advantage to the muscles of alternate action and rest, than to receive constant support which they so soon learn to rely upon. With reference to the clothing worn on the lower extremities, it may be mentioned that coldness of the feet is sometimes caused by wearing too tight fastenings to the stockings, thus impeding the capillary circulation in the legs, and the return of blood to the heart.† Internal congestions may thus become more liable. The shape of the shoes is of great importance. Man has a much narrower base of sustentation than most other animals, which renders it important that that base should not be lessened by cramping the feet in narrow shoes, rendering progression difficult, awkward, and quickly fatiguing. But probably the most serious fault in the feet coverings is the elevated heel often given to them. By elevating the heel, besides the still narrower base given, whether in progression or standing, the anatomical relations of the whole body as an instrument of locomotion, are materially changed. As in curvature of the spine, a deviation from the proper position at one point may cause several other compensating curvatures, so an

* Skirts should be held up either by the shoulders, or by a broad band passing *around* the hips and *below* the abdomen.

† The best means of holding up the stocking, besides tapes from the hips, is the old-fashioned woolen knit garter, its fibrous nature allowing it to be lightly put around the leg, while the common elastics must be so tight as to constantly compress the leg, or they will not stay up.

improper position of one part of the locomotive apparatus will cause a succession of other false positions of other parts. By elevating the heel and constantly keeping the flexors of the feet on the stretch, relief to them is instinctively sought by a slight flexion at the knee; this would destroy the perpendicularity of the figure, were not another slight flexion attempted at the hips, but as this would throw the trunk forwards, requiring still another flexion backwards, a compromise is effected by curving forwards the spine and inclining the head. Thus high heels tend to produce and permanently establish a succession of zigzags from the ankles upwards, with the weight of the body supported by the tension of the muscles, and not as in erect stature by the bony framework. The injurious results of persistence in such positions, falls not so much on the legs as the trunk and its contents. The head inclines forwards, the chest sinks, the spine curves too far backwards, the abdominal coverings are relaxed, and the belly pendulous with the weight pressing down into the pelvis. From their characteristic anatomy, smaller feet, broader pelvis, larger abdomen, and weaker muscles, it must be evident that the female must suffer much more from this cause than the other sex. It will be seen that as regards the relations of dress to human anatomy and movements, the faults above pointed out, all centre, in the female, about the pelvis, and becoming cumulative, even without apparent wrongdoing on the part of the subject, may be amply sufficient in connection with other causes, to account for the large proportion of uterine derangements among our countrywomen. It may also shed some light upon the ill success that has hitherto attended the medical treatment of those diseases, and point a way to better success in future.

§ 28. It has been previously mentioned (§ 9.) that the mind exerts a powerful and often a controlling influence upon corporeal nutrition; it is equally true—such are the inter-relations of mind and matter—that bodily conditions influence mental manifestations, and the relation of corporeal exercise and mental manifestations has probably a more intimate connection than any other vital phenomena. *The performance of function*, whether of mind or muscle, is necessary to health, and these functional activities cannot be separated one from another with-

out detriment. Aside from the general hygienic influence of muscular activity, and the consequent purity of blood, (§ 1,) the elimination of carbonic-acid, so destructive if retained, and the introduction of an increased amount of oxygen, so enlivening to the brain and nervous system, there is a positive and immediate correspondence between muscular and mental activity. Harmony is the great law of nature. With the body trained to vigorous health—not the stupid blunting of the sensations by muscular over-work—the health and proper activity of every function of the mind *must* be wide awake to the perception of moral or scientific truths. But beware of systems of ethics emanating from a connection with paralytic muscles or theological dogmas receiving their inspiration from bad digestion. This is a *practical* question, and will ere long become an *agitated* question in its application to the rising generation. There can be no just education while ignoring physical training. Education does not consist in efforts of the memory alone, but in the developed power to properly *use* facts and principles, as we would use our muscles. Exercise and ratiocination are almost convertible terms. The *pleasure* of exercise, that peculiar feeling of physical enjoyment which the manifestation of any function always imparts, is enhanced as the clear and coursing thoughts occupy one's mind after such exercises as are adapted to one's wants.

THERAPEUTICS OF THE MOVEMENT CURE.

§ 29. To those who have carefully read the preceding pages, and have noticed how many of the vital phenomena are more or less influenced or controlled by the will acting through bodily motions,—the purity of the blood, and its proper circulation in the capillary net-work,—the determination of the amount and quality of local as well as general nutrition,—the direct and reflex action of the nervous system, and the influence of mind on functional manifestations, &c.—it will be easy to comprehend the wide and important application of this treatment in the cure of many forms of chronic disease. Indeed, the resources of motion in therapeutics have scarcely begun to be appreciated; certainly not by those who have not paid particular attention to this subject. What method, for instance,

have we for securing a proper peripheric circulation? Cold hands and feet, if they are often the effect of disease, may be also and often are the *cause* of serious derangements. Not only from the depressing effects of such a state upon the nervous system, but serious internal congestions are often the result of this abnormal distribution of the circulating fluids. If we wait for the slow progress of convalescence, irreparable damage may be done to some surcharged vital organ. But, besides the many cases where common exercise is impossible, but where this abnormal circulation is still the proximate cause of the derangement, there are many cases perfectly competent to take a certain amount of exercise in which no amount of it that they can endure without harm will secure a proper distribution of blood in the extremities. The reason plainly is that, in these cases, from the small amount of available force, and the character of the exercise, the already oppressed lungs, heart or other vital organ is obliged to labor even harder than the extremities, so that, the blood flowing most towards those parts, enduring most labor, forsakes the extremities, and accumulates about the internal organs; thus defeating the very object aimed at. It is very true that where there is no actual central congestion, and the mal-distribution of circulation is only temporary, any proper exercise will be ample to secure a peripheric distribution, because there is no chronic depression of a vital organ and no more than ordinary effort on the part of such organ in accomplishing the exercise. But every physician must have noticed, and many, no doubt, are perplexed at the fact, that gymnastics, walking or other exercise, often produce palor, coldness of extremities, palpitations, oppressed respiration, &c., in many cases where these very symptoms, it is most desireable to prevent. It is these same cases where to secure a proper circulation in the extremities would relieve the depression of the nervous system, relieve over-burthened central organs, allow repairation to take place, and secure harmony in all the functional manifestations and consequently cause health to supervene.

§ 30. The method of securing this peripheric circulation is very easy to comprehend. As it is muscular contraction, in connexion with the expenditure of innervation, that governs the course of the sanguineous circulation, we have only to contrive

such movements as will cause a greater demand for blood in the extremities than in the central organs. Suppose the patient be made to sit quietly, in an easy, reclining position, where no muscular contractions will be necessary, other than those of the extremities acted on. Now, if the patient be made to flex, and extend the various joints of the extremities, in a slow and uniform manner, (§ 13), the force being increased by being resisted by an assistant, an increased capillary circulation, in the parts thus acted on, will be insured; because a physiological demand has been made for a supply of nutrition, which the system is capable of responding to, to the fullest extent of its resources, because this demand is not counteracted by others, made at the same time, at distant or opposite points. The sanguineous circulation is not divided or deviated from its flow towards the only points making, at that time, an extra demand for nutrition. Even entirely passive movements—that is, movements that do not engage the patient's volition—may be so applied as to afford a normal mechanical stimulus to local capillary circulation. These ideas are made plain by the following illustrations:

§ 31. Fig. VII. represents a chair,* with a moveable back or flap, so constructed that it may be adjusted at any angle, or laid down flat; in which latter position it presents a level, horizontal surface. It should be well cushioned with hair. Now let the patient sit, reclining, on the soft cushion, at such an angle as is most comfortable, usually at about forty-five degrees, with the leg and foot resting on the assistant's lap, as represented in the figure. By placing the palm of the hand on the toe, and moving it around, in the circumference of a circle, such a rotation will put all the muscles and elastic tissues in the alternate stretch and relaxation, as far up as the knee. The effect will be an acceleration of the circulation, in the capillary net-

Fig. VII.—*Rotation of Foot and Flexion of the Knee—a Derivative Movement.*

* The figures and explanations in the text are only intended to illustrate certain *principles*, and not (only incidentally) the *mechanics* of the treatment, which will be given with the nomenclature, in the appendix.

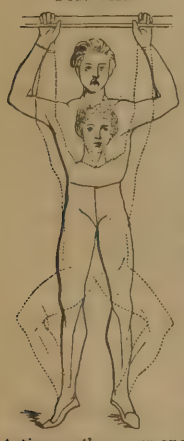
work, which is again supplied from the larger blood-vessels. Besides being exceedingly agreeable to the the patient, warming the feet, and relieving the head or other congested organ; it is all accomplished without the least expenditure of nerve-force on the patient's part—a matter of the utmost importance in many cases. Or, let the patient, in the same position, extend the foot very steadily and slowly (§ 13) against a firm resistance of the assistant, and let the assistant flex the same against the patient's resistance. (§ 17), and the muscles employed in stretching the foot will have been put in powerful action. The same may now be done with those that bend the foot, after which, all the muscles below the knee have been put in the most favorable condition for causing the greatest amount of tissue-transformation, (§ 5), and requiring the greatest supply of plasma through the sanguineous circulation, which immediately responds and flows in that direction, because no other similar demands are made in any other. Hence the phenomena has been *localized*—like a foot-bath, in contra-distinction from the general effect of a bath over the whole body—but with an incidental derivative influence upon the system at large.

§ 32. In the same manner, there may be flexion and extension of the knee. The assistant slowly presses the leg down, from *b* to *a*, against the resistance of the patient, and the patient then extends the leg against the resistance of the assistant, bringing into powerful action the extensors of the leg. The same movement, reversing the manner of resisting, will act upon the flexor muscles of the leg. The figure represents the flexion and extension of the knee, as well as that of the foot, with rotation. Thus it will be seen that, while a feeble patient is sitting quietly in a peculiarly comfortable position, with but a trifle of the effort required to accomplish any ordinary exercise, all the elastic and muscular tissues of the lower extremities have had to be supplied with a large amount of arterial blood, which has been derived from superior organs—perhaps congested ones—and all others, not at the same time requiring more than an ordinary amount of nutrition. The same principle may be applied to every possible movement of both the upper and lower extremities, with the most powerful and permanent derivative effects. And, for delicate cases, where there is any cause contra-indicating the employment of the next class of peripheric movements,

I know of no other method that pretends to control the circulation to anything like the same extent.

§ 33. But it is not always necessary, in employing movements to secure an increased circulation in the extremities, that the patient should be either wholly inactive or active only in designated extremities, as above illustrated. Some cases can bear and require a different manner of procedure, either alone or in connection with that just described. All *general* muscular contractions *that do not accelerate the heart's action, or disturb respiration*, produce a decided centrifugal effect upon the circulation. This is especially true, *when this general contraction takes place while the limbs are extended.* The reason is obvious. Besides the tissue-metamorphoses accompanying this functional act, requiring a larger amount of the plasma of the blood to be distributed among the muscular tissues, the general *compression* of the capillary net-work mechanically drives forward the fluids into the veins, whose place must be supplied from the larger vessels and internal organs. And when the position is such that there is a gradual increase of muscular force, from centre to circumference, the conditions are most favorable for such a peripheric determination of the circulating fluids. To secure the desired result, the conditions just laid down must be rigidly adhered to, or other effects will be obtained, as will be seen as we proceed. Several examples will make these ideas sufficiently plain.

Fig. VIII.



Acting on the upper and lower extremities at the same time.

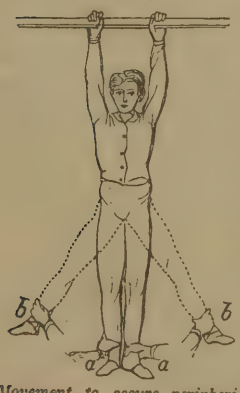
Fig. VIII. is easily understood to represent a curtseying movement. The patient takes hold of a pole, about six inches above his head, his elbows being bent at about right angles. He then slowly raises on his toes, and curtseys down, till his arms are straight, where he hangs a few moments, and then, slowly stretching the legs, rises into the first position again. This is repeated three to six times. To make it still more powerful, the assistant presses down upon the hips, if necessary. Such a movement requires but a slight effort, is very general in its action, and affords a good illustration of gradually increasing muscular tension towards the extremities.

Fig. IX. shows a less general, but useful movement, promoting a peripheric circulation, and, at the same time, having a definite effect of its own. The arms may be extended horizontally, stretched over the head, or as represented in the cut, according to other circumstances. The hands seize the pole, one leg partially supports the body, while the thigh of the other, with the knee bent at right angles to it, rests on a support, as represented in the cut. The patient then slowly stretches the leg, (against resistance), and it is then pressed down, against the patient's resistance. This movement puts the muscular and elastic tissues, on *both sides* of the leg, in powerful action, which is extended to the glutii and the spinal muscles of the same side, as far up as the middle of the back. If the object is to treat both sides alike, the same is to be done to the other side also. This movement is often given in scoliosis. For instance, in scoliosis to the right, it would be given on the left leg. It is a derivative, peripheric, special movement, affecting principally one lower extremity, of which there is a large class, and of which only a few of the most simple and least complicated, either in idea or execution, can be introduced here.

Fig. IX.

Muscular action of the extremities, but principally in one leg, and up that side of the back.

Fig. X.



Movement to secure peripheric circulation.

Fig. X. represents a person hanging by the hands. It is easy to see that the most powerful force will be required in the hands and arms, to sustain the body, and that the muscular effort must gradually diminish towards the lower extremities, coming to its minimum in the legs. Now if the patient separate the legs, by moving them slowly, from *a a* to *b b*, against strong resistance, and they are brought back again, from *b b* to *a a*, while the patient resists, the muscular contractions that are cumulative in the shoulders and arms are propagated along the lateral hemispheres of the body

into the legs, making muscular action and compression general, over the whole body, and particularly along each side of the trunk. When properly taken, the heart's action need not be disturbed, and, from the ribs being everted, and chest expanded, by the position of the arms, respiration is *relieved* and easy. This movement, when properly given, is followed by the most agreeable glow and feeling of relief and comfort over the entire surface of the body.*

§ 34. The illustrations, above given, are by no means intended as those movements most commonly employed for the purpose which they simply illustrate. The particular ones to be used must be determined entirely by the indications of the case. Very often several objects are attainable, more or less perfectly, by the same movement. For instance, the movement shown in Fig. IX., while promoting a peripheric circulation, especially strengthens some of those muscles that are weakest in scoliasis. So, also, there are often various combinations of the above described two classes of movements for securing a peripheric circulation, according to the muscular and nervous power of the patient, &c. Movements of which, Figs. VIII., IX., and X., are examples, though easily executed by those having quite ordinary strength, without increasing the heart's action, would be too powerful for many cases that would be capable of greater effort than what would be required in movements represented in Fig. VII. But it is not always necessary that the patient should be in the upright position. Suppose, for instance, the patient should lie horizontally on his back, with an assistant pulling at his hands, and another at his feet, instead of the weight of the body in hanging, the muscular and elastic tissues would be put upon the stretch, in the ratio of the traction made, which, again, could be controlled by estimating the patient's strength; and, if the same movement be made, as represented in Fig. X., the effect upon the circulation, though less, would be similar to the other. So, also, in the same lying, or any other proper position, by aid of assistants to force or resist, movements similar to those represented in Fig. VIII., viz.: flexions and extensions of the arms and legs could

* In speaking of movements, I always mean, unless they are otherwise described, the same repeated *four* to *six times*, and *always* very slowly.

be taken, varying in intensity according to the condition of the patient. Thus, an almost infinite variety of movements may be contrived to suit every possible capacity or exigency, all tending to the accomplishment of a specific result. And let it be remembered, that none should be employed except such as do, from their anatomical and physiological relations, clearly tend to produce the result which the pathological condition indicates as desirable, else harm would be done, instead of good. And, in the treatment of disease by movements, it should never be forgotten that the first, middle, and last object to be attended to, is *to secure a proper distribution of the circulating fluids.* When this is secured, in many cases, there will be no further need of medical aid; for, let me repeat, that healthy peripheric circulation implies an absence of all internal congestions, and a consequent free play of all vital activities. In other cases, it is only necessary to continue the same course till the *quality* of the blood and the processes of nutrition (§ 1 and § 3,) shall have been improved, when morbid processes will cease, and healthy conditions take their place. But, in those cases where other pathological conditions require appropriate treatment, it must be added according to the indications. Thus, to place in contrast with the above, and to show, in a clear light, the principles and resources of the treatment under consideration, I will next proceed to the treatment of

CONSTIPATION.

§ 35. How often is constipation of the bowels *really* cured by any means hitherto employed? Cases do recover; but in what proportion of such does the physician deserve any credit for their restoration? Is not the greater portion of these cases, persons who have "thrown physic to the dogs," and paid more attention to general hygiene? And yet there is not a single "ill that flesh is heir to," so common, in civic life, as constipation of the bowels, and one for which medical skill is so often implored for relief from in vain. There are vast multitudes whose only desire—medically speaking—is to be relieved of this distressing malady; to whom, to be freed from their slavery to the pill-box or the syringe, would be bliss indeed. And yet this is neither a formidable, nor dangerous disease. Why this acknowledged

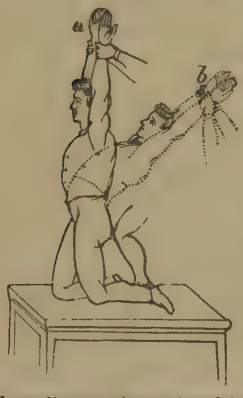
failure in so simple a disease? for, it is admitted, that evacuating the bowels by cathartics, is only a temporary expedient, and does *not* tend to cure the disease, but rather to increase its incorrigibility. Perhaps medical treatment is as efficacious here as in other diseases, but it is one of those rare cases where tangible results present a true index of the benefit received, leaving no chance for deception or doubt. Is the true pathology of intestinal constipation understood? With all due deference to my superiors in the profession, I believe it is not; else why this lamentable failure in the treatment? Constipation is usually treated like a lazy horse, that needs to be whipped; whereas, it should be treated like a fatigued and hungry horse, that needs to be fed—not in the intestinal cavity, for that is out of the system, but fed in the tissues, by securing to them a healthy capillary condition. In every case of constipation, the bowels do as well as they can; what can be done to assist them? The proximate cause, in most cases, of their inability to evacuate their contents, is a deficiency of intestinal mucous or other fluids, debility of the non-striated muscular fibres, and consequent inadequate vermicular motions, and feeble innervation. Now, the conditions under which the glands secrete intestinal fluids—under which the non-striated muscular fibres can perform their functions, and innervation can take place—is a healthful supply of arterial blood in the capillaries of those organs. That these are not well performed, implies that this proper supply is somehow cut off; besides, the appearance of the tissues themselves, as well as the success of the treatment based on this theory, demonstrates that, in constipation, there is a condition of retraction (§ 20) of the tissues involved. Exosmosis has exceeded endosmosis, till the cell-structures and capillary net-work of the intestines have had their capacities considerably reduced, with a consequent reduction of their functional manifestations. It has been shown (§ 21) that, in affections of visceral organs, the external parts are secondarily affected in the same manner as the organs beneath them. Thus, we find, in constipation of the bowels, as a general rule, the parts are hard, contracted, and unyielding, having little of that peculiar doughy feel on manipulation, so characteristic of healthy organs. The apparent exceptions to this rule, only prove the rule itself; for, when constipa-

tion is accompanied by a soft, flabby condition of the parts, as it often is, especially in females, it shows an atonic condition, the result of the previous state long continued, and requiring nearly the same general course of treatment. But constipation NEVER occurs while the abdomen retains its ordinary physical appearance to the touch.

§ 36. From the pathology of the disease under consideration, it will be inferred that eccentric (§ 15) movements topically affecting the abdomen, will be indicated in constipation; or, where the retraction has progressed to atony, both eccentric and concentric movements will be required. The object is to induce an *arterial* capillarity of the abdominal contents and muscular coverings, (§ 21). This is to be done by the employment of such movements as expand—draw out—those muscles and parts, against their effort to contract, and by supplying, in various ways, the *mechanical* stimulus necessary to their healthful action. For the medicine they require is mechanical—all organs have their mechanical stimuli—not chemical.

Fig. XI. represents the patient kneeling upon a bench, with his hands stretched over his head. The assistant then places one knee on the patient's sacrum, and grasps both of his wrists with his hands. From the position of the hands, the ribs are drawn up and firmly held, making the chest a firm attachment for the abdominal muscles. Now, if the patient be drawn back, from *a* to *b*, as represented in the figure, the fulcrum of the movement will be in the abdomen, by which both muscles and contents will be most powerfully expanded. If it be a case of atony of muscles, with the pendulous belly, so common in females, the patient may now bend forward against the resistance of the assistant. Here we have a converging of all the muscular power of the system towards one point, and that point is the abdomen. Sanguineous circulation and innervation all tend to flow in the same direction, and the expanding of the capillaries, by the eccentric movement, is most favorable to it.

FIG. XI.



Expanding anterior portion of the trunk—acting principally on the abdominal contents.

Fig. XII. represents another example of movements used in the treatment of constipation. The patient is lying upon a table, the chest firmly fixed, by the extended position of the arms, as before, which an assistant firmly holds, and the legs, from the hips, projecting beyond the table. Of course it must take considerable force of the abdominal muscles to keep the legs thus suspended in the air. An assistant then places his hands upon the ankles, and presses both legs down, from *a* to *b*, as represented in the cut. By this means, the muscular, tendonous, and elastic tissues of the abdomen, and the abdominal contents, are very much expanded; and the latter, being somewhat pressed upon, are made to assume new positions in that cavity. In those cases where the patients are not perfectly competent to maintain this position, without requiring too great effort to hold up the legs, or to resist the pressing down, then the assistant places one arm *under* the patient's legs, and assists him to hold them up, to make the movement in a proper, gentle, easy manner. For, I must constantly repeat that, however severe a position or movement may *seem* to be, in practice, it must *never* be exhausting to the general system. It must be remembered, however, that a powerful contraction of a single muscle, or small group of muscles, may take place, with but slight expenditure of nerve-force, if all the rest of the system be at rest; a movement that would be wholly impossible, if attempted at the same time that a similar contraction was progressing over the whole body. In this manner, the whole system, of even the most delicate persons, may be progressively subjected to isolated, powerful, muscular efforts, that would be impossible, or very harmful, if attempted all together—as in gymnastics, calisthenics, &c.; besides the rapidity (§ 27) of these latter cause a fearful and useless waste of nerve-force.

Fig. XII.

Expanding Anterior Portion of the Trunk—acting principally on the Abdominal Contents.

§ 37. But to return to the subject. It will be seen that the

legs, acting as a weight, and the assistant, by the under arm, taking off as much of that weight as he assists in holding up the legs, the power of the movement can be graduated to any degree of force, according to circumstances. Where the retraction is well determined, the legs had better be elevated by the assistant, without any help from the patient, thus making the movement entirely eccentric; but, in recent cases, or in very long-standing cases, accompanied with atony, the patient had better assist (according to his ability) in elevating the legs, thus making the movement both eccentric and concentric. Here, as in the previous example, we have all the contractile force of the system, that it is thought best to call into action, converging towards, and concentrating in the abdomen, carrying along, and, as it were, depositing there—*providing no counteracting movements are employed*, which there will not be, if the physician understands his business—a certain amount of functional ability. These examples are only intended to illustrate one prominent idea in the treatment of intestinal constipation. Of course it could be carried out in a multitude of ways, to suit all possible conditions and cases—adapted equally to the strong man or the most delicate lady.

In practice, great care should be taken not to disturb the circulation too much, by employing too many of the more powerful movements, for actual congestion may be produced. An *equilibrium* only is to be established.

§ 38. I mentioned, a while ago, that there is a *mechanical* stimulus to the performance of function. Every function is performed under the direct influence of *some* stimulus, or, more properly, several stimuli. Thus, light is the stimulus to seeing; sound to hearing; food to salivary and gastric secretion and digestion; volition and external impressions (reflex) to muscular motion, &c. Whatever things we are fitted to do, we must do, in order to retain the fitness to do them. Seeing begets sight, food digestion, motion strength, &c. Whatever we are fitted by nature to endure or withstand, a certain amount of those things we must endure, or else we lose the capacity to withstand or endure them. Hence our endurances become normal stimuli to function. We endure an atmospheric pressure of about 27,460 pounds, and any considerable less than that destroys us.

We are capable of extracting nutrition from crude food—*pure* nutrition will not support life. And so we are adapted, in the arrangement of our corporeal system, to endure and overcome certain physical obstacles, and, being thus fitted, we must encounter those obstacles, in some form, or lose our capacity to overcome them. They thus become the physical or mechanical stimuli to function. The aborigines of any country, and our own western hunters, are never troubled with constipation. The constant *motion* given to the abdominal organs, by their modes of life, supplies the necessary mechanical stimulus. The abdominal contents—from its situation below the chest and above the pelvis, being affected by the action of both extremities, contained in elastic walls, liable at any moment to have its space encroached upon by external objects—is adapted, by its peculiar and yielding structure, to receive a greater amount of jostling, in life, than any other organs. Indeed, this jostling becomes a necessity to its healthful action. Then, when business-men stand or sit at their desks; professional men in their offices; ladies at their music or embroidery, and school-girls at their studies, in positions and occupations imparting almost no motion to the abdomen—much less, even, than to other parts, when they require greater—why do we wonder that constipation is so common? One of the most important conditions, for the performance of functions, is withheld. This portion of the pathology of constipation again suggests the remedy. It is to impart *motion* to the bowels. This cannot now be done at labor, or in the ordinary course of exercise—it is too late for that, as enough motion of the whole system to sufficiently affect the abdomen, in its inactive condition, even if such exercises could act upon it in the right manner, would involve too large an expenditure of strength, and would cost too much. Motion must be *imparted* to the abdomen by another, and in such a manner as to answer the indications.

Fig. XIII. is intended to represent a *vibration* of the abdomen. The patient lies upon his back, generally with the shoulders slightly elevated—just enough, so that the abdominal muscles will not be drawn too tight, or so tight as to prevent the intestines from being influenced by the vibration; but these muscles should be sufficiently tight, so that, at each vibration,

they will be slightly stretched, thus preducing an eccentric condition in them. In some cases, where there is slight tenderness at first, for the first few times, the knees may be drawn up—as represented by the dotted lines—and held by an assistant, which position entirely relaxes the abdominal muscles. But this latter is not the most favorable position to produce the best effects in constipation. It is the true position in chronic diarrhœa.

An assistant then places the palmar surface of both hands on the abdomen, and makes a succession of sudden shakes or vibrations. This is several times repeated, with slight pauses between them. Another and very useful manipulation, is done by placing the fingers of both hands on the abdomen, over the caput coli, and kneading along the course of the ascending, transverse, and descending colon, several times repeated, pressing the fingers deep down into the tissues. Another, is to place the ulnar side of both hands in the illiac fossa, and press the abdomen, upwards and inwards, with a rolling motion ; or, place the hand over the pubis and press directly up, with a vibration. This latter is often better done with the patient standing. It should be borne in mind, that the effect of these various topical manipulations depend, in a great measure, upon the *position* of the patient while it is being performed. For instance, a vibration of the abdomen, while the parts are more or less expanded, expands the parts still more, at each jerk of the vibration, and this stretching of the fibres and capillaries is, in reality, an eccentric movement, added to the special stimulus of the motion upon the final nerve-loops of the parts. The effect of a vibration upon the fully relaxed abdomen, will be explained in speaking of chronic diarrhœa.

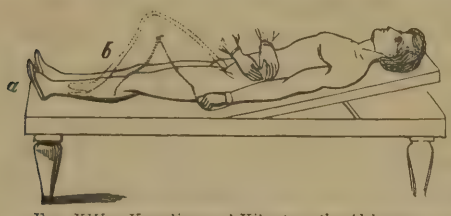


Fig. XIII.—*Kneading and Vibrating the Abdomen*

§ 39. We can avail ourselves still further of the influence of the nervous system, not only in securing a higher susceptibility, by this direct mechanical stimulus of the extreme nerve loops—or "peripheric brain," as they are often very properly called—but we can avail ourselves of the phenomena of reflex nervous

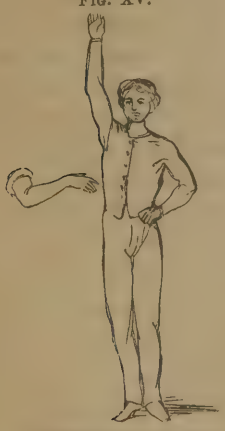
action. Fig. XIV. represents a "knocking" over the sacrum, from one trochanter to the other. The patient may lie with the face downwards, or, as is the more usual position, standing and leaning forwards, with the hands resting on a support, as a chair or table. A gentle knocking, with the clenched fist, over the glutii and sacrum, gives a very pleasant sensation to the parts, affecting the nerves distributed on that portion of the trunk, which stimulus is propagated along the afferent nerves to the centre, and from thence along the efferent nerves distributed to the intestines. (See § 8.) The vibration of the abdomen no doubt operates, also, somewhat in the same way. Percussion on the nates may seem a very simple, and, perhaps, to some, a frivolous procedure; but when we employ the same principle by tickling the throat to produce gastric contractions and emesis, and it is well known that irritating the mammæ will produce uterine contractions and abortion, &c., why hesitate to use so physiological a means of accomplishing an object? In my experience, this simple means has often produced an immediate evacuation of the bowels.

Fig. XIV.

Knocking over the Sacrum.

§ 40. I am satisfied that in constipation of the bowels, the *liver* has much more blame imputed to it than it really deserves. The liver is generally made a scape-grace to carry the blame attending ill success in treatment. Still it often is remiss in its duties, as well as the other organs, and needs to be admonished. Fig. XV. represents a percussion, or, technically, a "clapping" of the liver. The patient stands firmly on his feet, with the right hand stretched up over his head, and the trunk slightly bent to the left. In this position, the muscles over the liver, on the right side, are rendered very tense, and a percussion on them will cause a vibration like beating a drum-head. The liver being suspended by its ligaments, has the vibration thus communicated to it. It is an eccentric, neuro-tonic movement,

Fig. XV.



Percussion over the Liver.

and causes an increased secretion of bile. Indeed, I have known it to act, in a very susceptible person, as a cathartic, like Calomel. But, as a general thing, we do not expect movements to bring about immediate and violent results, but a gradual return to harmonious vital manifestations. The physiology of the liver-vibration is nearly the same as that just explained, in describing abdomen-vibrations. It is eccentric, and causes a greater influx of arterial blood, and the functions of the liver generally are stimulated, including the increased secretion of bile.

§ 41. The length of time required for the treatment above described, to bring about a healthy condition of the abdominal functions, depends, of course, entirely upon the general state of the system and the other complications; for here an alleviation of the symptoms can be only due to a certain actual gain, that from its nature must be permanent, because it arises, not from a temporary stimulus, but from increased ability of the organs. But simple constipation, in a person otherwise tolerably healthy, generally yields in from one to four weeks of daily treatment.* Of course, the same precautions should be taken to remove all exciting causes of constipation, such as improper food, mental emotions, &c., as though any other means were employed to improve this special function.

CHRONIC DIARRHŒA.

§ 42. Acute diarrhœa being attended with more or less inflammation and irritation, contra-indicates the Movement Cure treatment; but *chronic diarrhœa* comes very properly within this practice. Here we have a condition opposite to that of constipation; for, as the latter is accompanied with a retraction of the muscular and elastic tissues and capillary net-work, the former is characterized by a *relaxation* of these tissues. Venous stacis expresses the physical, and debility, with its ever-present irritability, expresses the vital condition of the abdominal organs. Mechanically considered, there is a stagnation of blood in the venous capillaries; or, more properly, perhaps, in

* About ten separate movements of different kinds, appropriate to the case, given once a day—more or oftener are not necessary, and might be injurious. But they must not be selected with reference to the constipation only, but to all other abnormal conditions.

that portion of the capillaries containing the venous blood—the serum of which passes by exosmosis into the intestines, or is imperfectly, though abundantly, secreted by the irritable intestinal glands. The physical signs indicate this, for the parts are soft and relaxed to the touch, and there is a general correspondence with this condition in all the contiguous tissues. (§ 20.) What, then, are the indications for treatment? They seem to be as follows:

1st. To relieve the local irritation, by irritating (stimulating) the general muscular system. Ordinary exercise, when sufficient to appreciably affect the muscular system, generally *aggravates* a chronic diarrhœa. The reason is obvious. The exercise, *as generally taken*, increases the previously existing general debility of the nervous system, by exhausting it out of all proportion to the *muscular* effort, and this nervous exhaustion is almost another name for irritability. Irritate or use the muscles then—controlling the circulation, especially the peripheric, where necessary—without making draughts upon the nervous system, and the nervous irritation will subside. This is accomplished by any slow, duplicated,* eccentric, and concentric movements of such a character as the patient's general condition will admit of.

2d. To act locally upon the parts by concentric movements, to correct the relaxation of the tissues, and accelerate the venous circulation in the capillaries, and produce a tonic condition of the parts. These movements will be exactly the reverse, in every respect, to those previously described for constipation, except that, in general, they ought not to be so powerful. But any bending forward of the trunk, or elevating the legs, while lying on the back with the arms by the sides, in which the abdominal muscles will be contracted against resistance, will be useful, provided they are given in easy positions, and are not fatiguing. Kneading the abdomen is of very great benefit in chronic diar-

* This term is used to denote *two forces*—the *patient's and assistant's*: the patient's movement being opposed by the assistant, (concentric,) or the patient's movement being *made* by the assistant, while the patient resists, (eccentric,) in distinction from free movements made by the patient alone. In this treatment, the movements are always with assistants—often with several.

rhœa. When this is done, the knees should be drawn up, as represented by the dotted lines in Fig. XII., and held by an assistant, and, generally, the head is a little more elevated than is there represented. The object of this position is to fully relax the abdomen, so that the parts, in any manipulation, *cannot* be put on the stretch, and so that the abdominal walls and contents can be freely rolled about by the kneading. Then, very gently, and without any punching or severity, the abdomen is clasped between both hands, and rolled from side to side and upwards for a few moments. After a slight pause, the motion is renewed and repeated, say six or eight times. It is well to conclude by a vibration, the same, but more gently than for constipation, as represented in Fig. XIII., it being done with the knees elevated, and on the relaxed abdomen, which makes the difference in the effects.

§ 43. Chronic diarrhœa is often attended with engorgement and sluggishness of the liver, sometimes with enlargement of that organ. Let the patient be seated in such a chair as is represented in Fig. VII., and perfectly relaxed in all his muscles. The assistant, standing before him, lays his hands over the liver on the floating ribs, and imparts to them a succession of vibrations, which tends to disgorge that organ. A strong bending of the trunk, through the hepatic regions towards the right, also has the same effect. Any twisting movement, properly done, that would compress the liver, would also be indicated and useful. But great care must be taken not to produce congestions, by employing too many of the twisting and sidewise bending movements—only one or two of such should be employed in each prescription ; but the principal movements for this disease should ordinarily be those that act on the extremities in comparatively easy positions, and kneadings and vibrations on the relaxed abdomen, liver, &c. The reason why the parts should be relaxed, is, that we wish to assist the venous circulation *out* of the capillaries, which the folding together, shaking, &c., of the relaxed parts, compressing, as it does, in a variety of ways, the network of capillary vessels contained in the tissues, and propelling forward the blood—it cannot recede, on account of the valves—towards the general torrent of circulation.

§ 44. While writing the preceding pages, I received the following letter, which so aptly confirms the text that I introduce it here.

"I have recently received from my friend and relative, two pamphlets written by you, on the subject of the 'Movement Cure,' which I have read with much interest. They have brought to my mind some facts in my own experience, which occurred more than thirty years ago. In my early boyhood, I lived some years at Long Branch, in New-Jersey, and, while there, had several severe attacks of fever and ague. In my fourteenth year, I went to New-England for an education, and, soon after I was of age, I settled in one of the eastern towns of Connecticut, in the practice of law. While there, and about seventeen years after I left New-Jersey, I was attacked with severe pain in the side, and, on stating the symptoms to my physician, he told me they were caused by a diseased condition of the spleen, arising from badly-treated attacks of fever and ague; and in a few weeks, under his care, I was entirely relieved. Some years after, however, the pains returned, accompanied with cough and other pulmonary symptoms, and fearing I was threatened with consumption, to which my mother's family were subject, I removed to Baltimore and went into the drug business there with my father. I took charge of the books, correspondence, &c.; but soon found all my unfavorable symptoms aggravated by this employment, and I quitted the desk and took charge of the retail department, and was soon relieved. I went to the desk again, and my old pains and cough returned; but a few days at the retail shelves relieved me. I began to inquire why such different effects resulted from these two employments. I always *stood* very erect at the desk, never allowed myself to lean against it, or to bend or contract my chest, and I wrote there with so much ease, that the labor was not at all severe. Our principal retail shelf was high, and the bottles on it large, (half-gallons,) so that I had to stretch up to my full height, and use both hands, to take down the bottles; our retail business was good, and the employment quite laborious. After considering the subject for some time, I concluded it was the *peculiar kind* of exercise (or movement, if you please,) that benefitted me, and I set about trying to get it in some other way. I stretched a rope across a large back room near the ceiling, passed a ring over it, so that it would slide easily on the rope, and attached a cord to the ring, and let it hang down so that I could just reach it with *both* hands. To the lower end of this cord I fastened a stick about three feet long, and when I felt any unpleasant effects from too long confinement at the desk, (where my services were very much needed,) I went to my swing, took an end of the stick in each hand, and ran backward and forward, and danced, jumped, and exercised as much as I thought necessary, and always found relief from it, and was finally entirely cured of the disordered condition of the spleen, and have never suffered from it since. My cough, however, continued, and, after two years, in Baltimore, I went, by the advice of my physicians, Professors Potter and Hall, to Florida, where I lived six years. I was there in the very seat of empire of fever and ague and other kindred diseases, and disordered spleens were the rule, and not the exception. I recommended my swing, and, in hundreds of cases in which it was tried, it never failed. Your pamphlets, it appears to me, afford a solution of the principle involved, and I thought, perhaps, you would regard the facts as affording some support to your certainly very plausible

theory, and therefore I communicate them. Numerous other facts have, doubtless, been observed by others, showing the effects of *particular forms* of exercise or movement on disease, which, from not knowing on what principle they could be explained, have been regarded as accidental, and not worth the trouble of examination. It is so in all matters of investigation, and, doubtless, so in this."

§ 45. It will be seen, by the above interesting narrative, that the gentleman employed, in a crude way, the very means that answered the indications. At first, the reaching up, while holding heavy bottles—which, from the nature of their contents, must be carried slowly—no doubt often rising on the toes to increase the height, and afterwards the hanging by the hands, while exercising the legs, were very effectual means, and, for not too feeble cases, very proper means of promoting a perepheric circulation, and consequently relieving the congestions of the spleen, lungs, &c. At the same time, the raising and falling of the chest and diaphragm, alternately compressing and relieving the visceral organs, produced an effectual kneading, and supplied a local means of disgorging venous stagnations. It is hardly necessary to remark, that almost any other labor or exercise that he could have taken would not have had the same result which seems to have been the case in this instance. This corresponds to the well-known practice in Ireland, of hanging by the hands, from the limb of a tree, to cure complaints of the liver.

§ 46. In contrast with the above account of the excellent effects of *proper* movements, the following case will show the harmful effects of *improper* ones. A lady relative got advice for dyspepsia. She was directed how to take a certain number of movements, in a particular order and manner. In a few days, she came back very much worse. On inquiry, it was found that she had only taken those most conveniently performed, which happened to be the trunk *bendings* and *twistings;* which, without being administered *with a proper number of peripheric movements*, produced actual gastric congestion. Her form of dyspepsia was what is called chronic gastritis, and hence she was made worse in every respect. Her fault was explained to her, when, by pursuing the proper course, she was soon relieved of all unpleasant symptoms.

I hope no one will understand me as believing in, or advocating an arbitrary and empirical selection of certain movements

and manipulations for certain diseases, from the simple and often delusive fact, that the patient was sick, took movements, and got well! Movements are *physiological phenomena*, the effects of which can be *foretold*, as well as the effects of respiration.

DYSPEPSIA.

§ 47. It is probable that the physician is more frequently consulted with regard to some of the many forms of this disease, than for all others that pertain to civilized life. And this will continue to be the case until the people of civilized nations have many of their habits of life—especially their dietetic habits—radically changed for the better. To mention all the complications, and enumerate all the symptoms that are every day poured into the physician's ears, would require a good-sized volume; but it is not necessary in a work like this, which pre-supposes the reader to be already acquainted with the characteristics of disease, in every form. But, given the disease, how shall it be treated? The object of this work is simply to point out general principles, as viewed from the physiological stand-point which the movement cure occupies, in those cases where it is applicable, rather than present formulas and prescriptions. And, speaking of symptoms, leads me to remark, that probably in no disease is the practitioner so frequently led away, in his treatment, on a will-o'-the-wisp chase after "symptoms," to extinguish them, as in dyspepsia. He chases acidity with alkalies, constipation with laxatives; guesses the liver is to blame, and throws a stone at it, in the shape of blue-pill. Now he is after "eructations," anon it is "water-brash;" this time one "bad feeling" must have its remedy, next time another; till both physician and patient are forced to give up the chase from sheer exhaustion. And yet it is admitted that diet and general hygeine are the only reliable means of cure. The symptoms present with the history of the case are necessary to establish the diagnosis, after which the disease should be treated on general principles—the usual, unpleasant symptoms being *effects* that must be *borne*, rather than conditions requiring constantly to be interfered with; and this is the general experience of dyspeptic patients and physicians.

Simple dyspepsia, in all its varieties, may be reduced to two general classes, embracing pretty well-defined lines of demarkation.

First, we have what nosologists denominate "chronic gastritis." This condition is characterized by "more or less thirst; a dry skin; scanty and deep-colored urine; a red tongue, red especially at its tips and edges, patchy and fissured, perhaps, or smooth and glossy like a piece of raw beef. The throat is also frequently tender, and the pharynx and palate unnaturally vascular."—(WATSON.) There is also, generally, tenderness in the hypochondriac and epigastric regions. A voracious appetite, and much distress during digestion, often accompany this disease.

In the *second* place, we have what may be called "atonic dyspepsia;" not implying that the first is *stenic*, for *it*, also, is atonic in its nature, but accompanied by more active symptoms, the latter being characterized by still greater debility and fewer severe symptoms. Indeed, in some cases, the patient is not aware of the nature of his disease, and, while he eats and drinks nearly as usually, though failing in strength, he can scarcely be made to believe he is troubled with indigestion. Generally, however, the patient finds no difficulty—by a variety of annoying symptoms, principally of a nervous character—in determining the seat of his disease. There is great prostration; the tongue is relaxed, of light color, showing the points of the teeth on the edges, and tremulous on protruding it; the appetite is variable, generally not very craving before eating, but is not appeased by food—the patient often eating much more than he at first intended to; digestion not often attended with actual pain, but slow, and yielding little strength to the frame. These distinctions, in the pathology of dyspepsia, are well founded, and require to be recognized in the treatment.

§ 48. Chronic gastritis, contrary to what its name implies, is really a disease of debility, the same as strumous ophthalmia is a disease of debility of another kind, or as atonic dyspepsia is a disease of debility; only the former is characterized by a debility of the *vessels*, while the latter is characterized by debility of the *nerves* and *muscles*. In chronic gastritis, there is venous congestion of the capillaries of the stomach, attended with turgescence and irritability of that organ. Dyspepsia is a constitutional disease, of which the so-called chronic gastritis is only an important symptom. But the difficulty of nutrition neither begins nor ends in the stomach. This is illustrated by

the affection of the mucous membrane of the pharynx and larynx, in "minister's sore throat," which likewise results from constitutional causes. Even when the dyspepsia is brought on by improper habits of living, it is altogether probable that the constitution suffers before the gastric troubles manifest themselves. Indeed, such improper dietetic habits do not always cause disturbance of the organs immediately concerned in digestion, but beget other and far different diseases; thus effectually disposing of the common argument, that no food is injurious that does not "hurt the stomach" of the person using it.

§ 49. In the treatment of dyspepsia, of course, the first thing to do is to correct the habits—especially the dietetic habits—of the individual; and this should be done by insisting on general principles, rather than the giving of specific rules. Having done this, what are the indications of treatment in that form called chronic gastritis?

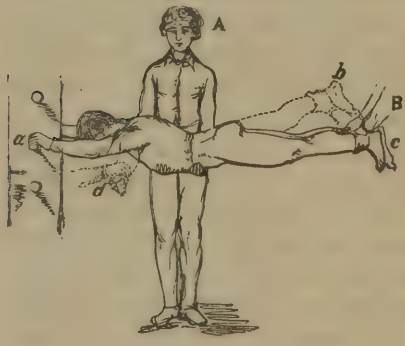
In this form of the disease, accompanying the gastric irritation and congestion, there is always great and most persistent coldness of the extremities, especially the lower extremities, which often remain blanched after the most persevering efforts to warm them. And does not the well-known fact that the gastric derangement is always in the inverse ratio of the circulation in the extremities, indicate the first step in the treatment of this disease? The first step, then, is to secure a peripheric circulation. All the principles laid down in treating of circulation (§ 29 to § 34 inclusive) are applicable here. At the same time, while the same means that secure a peripheric circulation relieve the gastric congestion, the interstitial processes, consequent on the muscular motions, promote a more healthful quality of the nutrient fluids, and, in the same measure, allay irritation and chronic inflammation.

§ 50. The principles heretofore laid down must be strictly adhered to, but the manner of applying them must vary according to the peculiarities of each case. Great care should be taken that the patient be not fatigued by any of the movements given him. It is a peculiarity of this disease, that very frequently no amount of free, voluntary exercise, which the patient's strength allows him to take, is capable of thoroughly "warming up" the surface and extremities of the body. In other cases, however, where there is yet considerable muscular and nervous ability,

the most distressing symptoms are often *immediately* relieved on the breaking out of a gentle perspiration, consequent on taking exercise. Sitting before a fire, or taking a warm bath—both securing a better peripheric circulation—will generally give the same temporary relief. In undoubted cases of chronic gastritis, accompanied by pretty severe gastric symptoms, such as tenderness at the pit of the stomach, &c., *there should be no movements given by which the trunk is bent through the centre*—especially sideways flexions, twistings, &c. Even when conjoined with constipation, great care should be taken that the movements intended to benefit the constipation do not aggravate the affection of the stomach. In such cases, it would be better to wait till the gastric symptoms are relieved, before treatment is specially directed to the constipation. It is probable, however, that in that case the constipation would, in most cases, yield with the dyspepsia, from general causes, without special treatment.

§ 51. After an equilibrium has been partially established in the circulation of the nutrient fluids, by some days or weeks of proper treatment to that end, then such movements may be given as combine a general action on the circulation, and a local stimulus to the stomach. Fig. XVI. is an illustrative one. The patient takes hold of the pins, each side of a post, at a convenient height, with the body suspended horizontally—one assistant (B) holding and making traction at the feet; another, (A) with both hands under the patient's abdomen, determines the force of the strain at that point—that is, the extent of the fulcrum over the stomach, for the weight of the body causes it to bend at that point—by the amount of assistance he gives the patient. The remaining in that position, causes a general compression of the peripheric capillaries, particularly along the *anterior* surface of the body, accumulating in force in the region of the stomach—a force that can be nicely proportioned by the amount of as-

Fig. XVI.



sistance given by assistant A. The position itself, from the stretched position of the patient, acts principally eccentrically on the tissues, causes a genial warmth to pervade the whole, and especially the anterior surface of the body. At the same time, the stomach is gently compressed, in a proper manner to stimulate its functions without causing irritation. But if, in this position, the legs be separated, after the manner represented in Fig. X., the same quiet but persistent action of the muscular tissue is propagated along the patient's sides, and *increased* in the anterior surface. Or, if it be desirable to make the movement still more powerful, and at the same time act principally on one lateral half of the body, assistant B may hold by only one leg, while a third assistant makes a movement from *c* to *b*, in the direction of the dotted lines; the same may be done with the arm. On which side of the body this single movement (in distinction from the *double* movement, where both arms and both legs make the same movement) is made, will depend upon other complications, as the condition of the liver, spleen, one side of the chest, &c. Again, if it is necessary to act more powerfully upon the stomach and bowels, assistant A may cease to render aid, thus throwing the patient's whole weight upon the anterior muscles of the trunk, with contractions converging in the epigastrium. This movement is exceedingly agreeable, and, with plenty of assistants may be given to the most delicate.

§ 52. But it is not necessary, to carry out the principle here illustrated, to always employ this particular movement. In a variety of ways, the same idea can be approximatively carried out. For instance, if the patient, standing erect, grasp a pole as high as he can reach over his head, and then have his hips gently pressed forward, keeping the knees and arms stiff and resisting, the anterior half of the body and the upper and lower extemities will be acted upon. But, in the commencement of treatment, in the form of dyspepsia under consideration, the principal indication is to relieve the nervous depression, and the gastric congestion and irritability, through equalizing the general circulation; after which, the same means may be employed that are useful in atonic dyspepsia.

§ 53. In atonic dyspepsia, sometimes called *nervous* dyspepsia, the indications are, to invigorate the whole system, gene-

rally, and the digestive organs, specially. There is a deficient quantity and poor quality of blood, but there is no marked gastric congestion. There is little ability to resist cold, which is more probably the cause of the cold extremities than the want of circulation in them. In atonic dyspepsia, the patient, if he suffers less pain, is yet more unvaryingly miserable. There is great debility of the nervous system, so much so that every movement is attended by an exhaustive effect, from which the individual is a long time in recovering. This debility extends to the mental-nervous system, producing, in many cases, hypochondriasis, with its miseries. The system needs nutrition—strength. The nervous energies may be increased, by acting through the muscular, in such a manner as not to employ too much of the former. The movements illustrated by Fig. VII., and the explanatory remarks are applicable here. Let the patient *be acted upon*—many passive movements given—flexions, extensions, rotations, &c., of the upper and lower extremities, while in a half-lying position, (Fig. VII.,) or in any manner that we can irritate the muscles with little effort on the patient's part. At the same time, mechanical stimuli (§ 38) can be applied, locally, with great benefit. Fig. XVII. represents the patient sitting (passive) while one assistant, standing behind, places one hand on each side over the short ribs, and another, standing before, places his hands over those of the first assistant; then, unitedly, a rapid vibration is imparted to the patient's sides. A general "shaking up" of the liver, spleen, and that portion of the viscera in the hypochondriac regions is the consequence.

FIG. XVII.

Vibration thro' the Middle of the Trunk.

Fig. XVIII. represents a method of acting still more directly upon the stomach. The patient sits, with the left leg drawn up, and the right arm extended over his head. The position is such, that by the tenseness of the right side, and the relaxing of the left side, the stomach is thrown far to the left. Now, if a hand be placed upon, or just below the floating ribs, as represented in the figure, by pressing up and inward, with a vibra-

tory motion, we impart the same to the stomach at the large extremity. A perceptible increase in the quantity of the secretion of gastric fluid is h e result. Another very good method of acting directly on the stomach, is this: Let the patient, lie as represented in Fig. IX., with the legs at the dotted lines, while the assistant, with the ulnar edge of the hand, passes across the abdomen, just under the diaphragm, and, with a sort of kneading motion, presses directly down upon the stomach. These manipulations are exceedingly agreeable to the patient, and he always arises from them with a great feeling of comfort and satisfaction.

Fig. XVIII.

Vibrating the Large Extremity of the Stomach.

§ 54. As the treatment advances, after the patient has gained some degree of muscular and nervous energy, then stronger and more general movements may be given. To act on the stomach and abdominal viscera, *rotations* of the trunk are very valuable. Fig. XIX. is a specimen illustration of such a rotation, though they may be given in many different ways. The patient is bound or held to a post, at the hips, while an assistant, grasping each of the patient's shoulders, swings him around, or "rotates" him, as represented in the cut. Ordinarily, it is better that the trunk should not be carried forward of the perpendicular; but where there is chronic diarrhœa, the rotation should not be carried back of the perpendicular. The nature of the movement is such that two purposes are accomplished—the lateral and anterior portions of the trunk, especially in the epigastric and hypochondriac regions, are put upon the alternate extreme and partial stretch, (eccentric movement); while the abdominal contents, particularly the stomach, have an effectual *churning* given to them by the peculiar motions of the body.

Fig. XIX.

Trunk Rotation, standing. It may also be given sitting.

Another movement, combining more purposes than the foregoing, is shown in Fig. XX. It consists of a rotation of the middle of the trunk, while the feet and hands remain fixed in their places, as shown in the figure. The patient takes hold of a pole, just above his head, in such a manner that when the arms are not flexed the trunk must be. The assistant then grasps him by the loins and whirls him around the circumference of a circle, indicated by the dotted lines, the only flexion being through the loins—forward, backward, and from side to side—the patient's face remaining in the same direction. This movement, while it gives a great deal of motion to the abdominal contents, and much exercise to all the muscles of all portions of the central part of the body, at the same time, from the contractions of the muscles of the upper and lower extremities, a very firm general peripheric circulation is established. It is useful in all derangements of the digestive organs. It would be too powerful for weak cases, especially in the beginning of the treatment.

FIG. XX.

Rotation of the middle of the Trunk.

§ 55. Already enough has been said to give the intelligent physician a sufficiently clear idea of the application of the movement cure in the treatment of a faulty circulation, constipation of the bowels, chronic diarrhœa, and simple dyspepsia in its various forms. The physiology of the treatment has, in a measure, been explained, and general principles illustrated and insisted on; but in practice, while the general principles will remove the same, we can seldom apply them to any disease in its simple uncomplicated form. Hence, no formulas can be given, but the physician must apply the principles to suit the indications of each case. But there can be no embarrassment, no mistake, if, perfectly understanding the apparatus with which we deal, we keep in view the great object of establishing an equilibrium among vital phenomena by means of physiological manifestations.

CONSUMPTION.

§ 56. It is foreign to the design of these papers to enter into discussions of the chemical or microscopical nature of tubercle, or even to mention the more prominent symptoms attending phthisis pulmonalis in its various stages, for these are fully and clearly set forth in the various modern works with which every physician is supposed to be familiar; but to consider the relations of the *general pathology* of this disease—and the same of every other disease treated of in this work—to *physiology*, in its bearings on the treatment under consideration. It is not necessary to consider any of the various modes of treatment that have been and are now advocated by different members of the profession, for I take up the subject where they all leave it, carrying it beyond art into nature; adding, it is to be hoped, a certain amount to any and all other means that may be employed to stay the ravages of a disease that carries off one-fifth part of the human race. In its relations to physiology, the movement cure is a perfect system within itself, and need not be mystified by connecting it with other subjects, than the necessary investigations connected with the known and common facts of medical science.

§ 57. I believe that, at the present day, the profession are agreed—and the treatment adopted is in accordance with this general agreement—that the essence of consumption lies in a faulty nutrition, a condition of the whole system of which the pulmonary tubercular exudations are only a symptom; a faulty nutrition depending upon an imperfect plasma, and a low organizing power in cell-formations. Dr. John Hughes Bennett, Sir James Clark, and others, have noticed that in phthisis pulmonalis the digestive functions are deranged, and every one knows that the lungs, infiltrated with tubercles, are incapable of admitting the proper amount of air to secure the necessary purification of the blood. But, after both these highly important considerations have been attended to, what are the indications still? What is necessary to render available proper food and digestion and plenty of air and respiration?

Nutrition neither begins nor ends in the stomach or lungs. These are necessary, but still *preparatory* steps to nutrition, which takes place in the *tissues*. Dr. Bennett says: "In the

first place, nutrition itself is more connected with proper exercise, and breathing fresh air, than many people imagine; it does not merely consist in stimulating the appetite and giving good things to eat. It requires, first, food in proper quantity and quality; second, proper digestion; third, healthy formation of blood; fourth, a certain exchange between the external air on the one hand, and between the blood and the tissues on the other; and fifth, it requires that there should be proper excretion, that is, separation of what has performed its allotted function and become useless. *All* these processes are necessary for nutrition, and not one or more of them, for they are all essentially connected with and dependent on one another. The means of preventing not only pulmonary tuberculosis, but tuberculosis in general, therefore consists in carrying out those hygienic regulations which secure these different nutritive acts. The most important of these, undoubtedly, are attention to climate, exercise, and diet."*

Hence it appears that all the accessories of proper nutrition may be present and still unavailing, until we can secure these perfect interstitial changes in the tissues; and, until this is done, the preparatory steps, digestion, respiration, sanguinification, &c., being controlled as to quantity and quality by the demands proceeding from the nutrition in the tissues, must take place imperfectly, in accordance with the imperfect tissue metamorphosis. How can there be proper digestion while the materials of nutrition passed into the blood, cannot be employed in tissue-making? and how can there be a normal introduction of oxygen by respiration, when there is less than a normal exchange between the tissues and the blood, (see § 3,) thus lowering the affinity of the blood for oxygen? How then, shall the system be placed in the most favorable condition for proper tissue transformation to take place, instead of the faulty manner connected with the disease under consideration?

§ 58. One of the most important indications is to produce tissue transformation (nutrition) by using the muscles. Hence, exercise has always been highly recommended in this disease, and often even unsystematic exercise is attended by the best results.

---

* "Pathology and Treatment of Pulmonary Tuberculosis," p. 68.

But simply to "exercise," may neither improve the strength nor health; it *may* injure both. Weakness, as well as strength, may result from the employment of any function. We see in our streets, every day, both men and animals made weak and even diseased by too much exercise, as well as by improper kinds. How much more likely is this to be the case in a diseased condition.

§ 59. In consumption, there is great debility and consequent irritability of the nervous system, and this condition is one cause of the imperfect general nutrition—and it happens that the exercises ordinarily taken, are such as produce fatigue and exhaustion in the nervous system, out of all proportion to its effect upon the muscles; thus leaving the system in a condition where it is incapable of being profitted by the organization of tissue of a higher vitality than that broken down by the exercise. The *general* indications then, will be met by employing the muscles, in such a manner that, while *they* are made to act with more or less force, no greater demands shall be made upon the nervous system than can be easily and healthfully responded to.

§ 60. There are a variety of *special* indications that can be responded to with great physiological exactness by this treatment. *The first thing to be attended to, and never to be lost sight of for a moment,* is the circulation of the blood. Feebleness of the heart's action, imperfect respiration, imperfect quality and quantity of the blood, and especially want of proper affinity between the blood and the tissues, all conspire to produce the livid countenance, cold extremities, and consequent pectoral congestion and oppression so characteristic of pulmonary consumption. If the reader has carefully noted all that has been said on the subject of controlling the circulation, (§ 29 to § 35, inclusive,) he will be prepared to understand the principle to be applied in selecting movements for the treatment of consumption. We should act almost wholly, and very perseveringly on the extremities, (§ 29) by rotations of the feet, hands, arms, and legs, and by flexions and extensions of the same, after the manner previously described, (§ 29 to § 33); *but there should* NEVER *be any attempts to expand the chest till after the peripheric circulation has been much improved.* And, during the whole course of the treatment, the securing and maintaining of a healthy

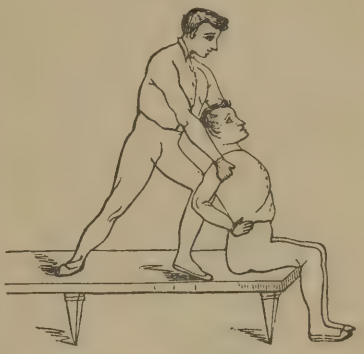
peripheric circulation should never, for a moment, be lost sight of. In practice, it is generally best to begin and end a prescription with movements having more or less reference to this indication, with two or three movements for special purposes in the middle. Insisting again on the importance of the foregoing, I pass on to illustrate more specific treatment in this disease.

§ 61. What was said under the title of "retraction and relaxation," (§ 20,) was published in August, 1858. These views have been strikingly confirmed by a paper read by Dr. J. W. Corson, at the session of the Academy of Medicine, held on December 1st and 11th, on "Management of the Shoulders in Examinations of the Chest," and reported in the *American Medical Monthly*, for January, 1859. I quote: "He had also an interesting and really useful sign to communicate, which had hitherto escaped notice. It was comparative *stiffness* in the movement of the shoulder *over the lung most diseased*, on short breathing, as watched carefully behind. For this, he gave the *sixth* 'position.' It was to face the back of the patient, a yard distant, near a window or white wall, and let him drop his arms, 'as if dead,' by his side, and breathe deeply, 'like a man a little out of breath.' The physician first 'takes aim,' like a rifleman, across the tips of the shoulders, and then draws nearer and watches the play of 'the inferior angles of the scapulæ in breathing, with a movement like the fins of a fish.' The *paralysis* might be either mainly 'acromial' or 'angular.' Curiously enough, this seemed to depend on the higher or lower location of the disease which *thus paralyzed the parts nearest*. A very elegant way of testing 'angular' stiffness, especially in a fully-clad lady, was to place the two index-fingers, as 'pointers,' lightly on the lower ends of the shoulder-blades, and watch their motion as she sighs. This stiffness was less in recent attacks. It varied most in *different stages* of phthisis, was slightest in pneumonia, and greatest in pleuritic affections." The same condition of the pectoral and intercostal muscles over diseased lungs, though not so readily *seen*, can be easily detected by the *touch*, after a little experience. It is reasonable to suppose that this condition of the muscles would be removed on a cessation of the pulmonary disease. But if a healthy condition of the *muscles* can be previously induced, why may it not have

a salutary effect upon the disease in the lungs? I believe it does have this effect, and analogy sustains this view. This rigidity of the respiratory muscles must impede respiration, even beyond what it would be impeded from the simple condition of the lungs, at the same time contracting the thoracic cavity.

Fig. XXI. represents how the chest may be expanded, the ribs everted, the thoracic capacity increased, and the anterior respiratory muscles stretched, in very delicate cases, even where it is not proper for the patient to make any voluntary effort. The assistant places one knee between the shoulders, (protected by a cushion,) then placing his hands in each axilla, gently draws up the shoulders and chest by the pectorales, major, minor, and subclavii muscles, at the same time pressing forward gently with the knee; the patient, meantime, remaining perfectly passive. This may be repeated six or eight times, and is invariably followed by a feeling of great relief to the patient. The pectorales, major and minor, subclavii and intercostales, have been put upon the stretch, (eccentric movement,) the capacity of the chest enlarged, and respiration relieved. In this disease, forward flexions of the trunk should be avoided as much as possible.

Fig. XXI.



"Passive" Expansion of the Chest, anteriorly.

Fig. XXII.

Drawing up the Arms, expanding the chest laterally, and promoting circulation in the upper extremities.

Fig. XXII. represents a more active movement. The assistant stands behind the patient, and then, leaning forward, takes hold of his hands, and, rising into the upright position again, stretches the patient's arms against the lat-

ter's resistance. The muscles of the entire upper extremities are put into action, the scapulæ are rolled outward and slid upward, the stiffened scapular muscles are thoroughly stretched, and the chest expanded laterally. After the assistant has made as strong traction upon the patient's extended arm for a moment as the case will bear, the patient gently draws them down again against resistance. Thus a most powerful action of the muscles of the superior portions of the trunk has been obtained with slight expenditure of the nervous force.

Fig. XXIII. represents a movement that gives more immediate comfort and satisfaction to the patient than, perhaps, any other. It shows the patient sitting astride a horse, with the feet resting on a ledge, and fixed in the stirrups, as seen in the cut. The position is such, that the lower part of the person is quite firmly fixed. The patient's hands rest on his hips. The assistant now places his hands just under the shoulder-blades, longitudinally, each side of the spine. The patient now bends backward, principally with the *upper* part of the trunk, bending it slightly *over* the hands, thus held (but not too firmly) against the back. Thus the patient's chest is expanded by *his own* effort, the posterior muscles contracting, and the anterior ones expanding, in counteraction to the sunken chest and protruding shoulders these subjects generally exhibit. To make it still more powerful, the arms may be crossed over the head. It should be repeated—after the patient, relaxing a little, has been pushed back to his first position—several times, very gently and slowly.

Fig. XXIII.

Backward flexion of the upper part of the trunk—acting on the posterior muscles, and expanding the chest.

Fig. XXIV. illustrates a compound movement, that accomplishes several purposes at the same time. The patient stands between two poles, the hands holding, and the elbows resting against them, the latter being at the height of the shoulders. The assistant then places his hands against the patient's back, and pushes him forward with some force, the patient at the same time rising on his toes, but not bending his knees or hips.

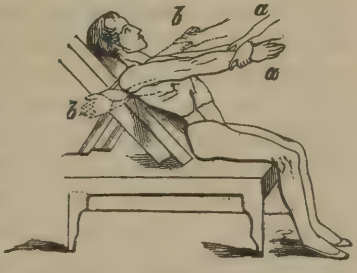
The chest is expanded, both *longitudinally* and *laterally*, and the whole anterior surface of the body is made eccentric, while there are powerful contractions in the arms and legs. The chest is expanded, and a general peripheric circulation is secured at the same time. The patient settles back into his original position, and the movement is repeated a sufficient number of times. It is very excellent when properly given; but care must be taken not to use too much force with feeble patients, but it can be adapted to the strength of the most delicate.

Fig. XXIV.

The whole body engaged in expanding the chest, promoting general circulation, and relieving pulmonary congestions.

Fig. XXV. shows the manner of developing the scapular and pectoral muscles, and expanding the chest when it is not desirable to act on a number of muscles at the same time. The patient is partly reclining, (half lying,) with the arms extended forward, when they are brought back, from *a a* to *b b*, by the assistant, to act upon the pectorales, and by the patient, when it is desired to act upon the scapular muscles. The elbows should be kept stiff. Much can be done, by variations of this simple movement, towards developing those respiratory muscles that are concerned in any of the movements of the arm and shoulder—a development utterly impossible in ordinary exercise; for, in the easy, sustained position of the patient, while all other muscles are at rest, he is able to make an effort with the pectorales, for instance, of considerable force, which, when the same effort is distributed over the whole muscular system, would effect them very feebly. Besides, a *local* effect is secured.

Fig. XXV.



Acting upon the anterior or posterior muscles that move the arm—assistant respiratory muscles.

§ 62. Twisting the upper part of the chest, in certain positions, is an excellent method of assisting the development of the respiratory apparatus.

Fig. XXVI. (A and B) represents a very excellent method of accomplishing this twisting. One foot (as the left) rests on a stool, and the arm of the same side is stretched over the head; the other hand rests on the hip, and assists in sustaining that (right) side. From the position—the muscles below the chest, on the side of the elevated arm, being relaxed by the position of the leg—the same side of the chest is lifted up and expanded.

Fig. XXVI.—*A.*

Twisting of the trunk—expanding one-half of the chest at a time.

Now, if the patient's left arm, at the wrist, be grasped by an assistant, and the opposite shoulder be pressed upon, the patient can be twisted back, as shown at B; and, if he then twists the left shoulder forwards, to the position represented at A, all the muscles concerned in twisting the trunk will be acting in concert to expand that side of the chest. The assistant may now pull the left side back to the position at B, and so repeat several times, the patient and the assistant alternately resisting.

Fig. XXVI.—*B.*

Twisting of the trunk—expanding one-half of the chest at a time.

To make the effect uniform in both sides of the chest, the same should be repeated on the other side: that is, with the right foot supported, and the right arm stretched up. But, if one side is more shrunken than the other, it may be given to expand that side only; and, likewise, it is very proper to give any of the previously described movements upon only one side, when there are any indications for so doing. There are many of these twisting movements that may be given, both more or less powerful than the foregoing, but the physician must prescribe them according to the requirements of each case, regarding *all* the pathological conditions presenting themselves.

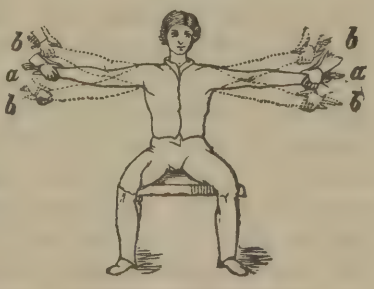
§ 63. The above are a few examples of how the shrunken, hardened muscles of the chest can be developed, separately, or in groups, in accordance with their physiological condition; the chest expanded, gently or severely, as the case demands, respira-

tion relieved, and the wholesome physiological reaction of a more healthy respiratory apparatus upon the organs of respiration themselves, the lungs, secured. But, in actual tubercular infiltration, this is not enough. There are masses of tubercle to be absorbed, if possible; and, also, there are quantities of pus, and mucus, and effusions of various kinds, filling the air-cells, and impeding respiration and causing capillary stagnation in the blood-vessels. To relieve the lungs of this mass of foreign matters that literally load them down, and make occasion for increased progress of the disease, nothing can compare to *vibrations* of the chest. The fluids must be shaken out of the lungs as water is shaken out of a sponge. Nature sets the example by establishing a cough; let art come to her aid.

§ 64. For very weak cases, these vibrations should be given with corresponding carefulness. Let the patient sit in a chair, like that represented in Fig. VII., and, while perfectly relaxed, let the assistant place his hands on each side of his chest, just below the axilla, and give ten or twelve gentle but quick shakes or vibrations; then, after a short pause, repeat them as before. This gives great relief to the sense of constriction across the chest, promotes expectoration, and relieves the cough. It should be frequently repeated, unlike most other movements, during the day.

Another and more powerful vibration, is well shown by the cut, Fig. XXVII. The patient sits erect, or he may stand, with the arms extended each side horizontally. An assistant, on each side, grasps each a hand at the wrist, and then, both at the same time, and with the same motion, bring the arms up and down, with a very rapid jerking vibrating motion, twenty or thirty times repeated. The vibrations from each side are propagated along the arm into the chest, where they meet, and are broken into very fine waves.

Fig. XXVII.



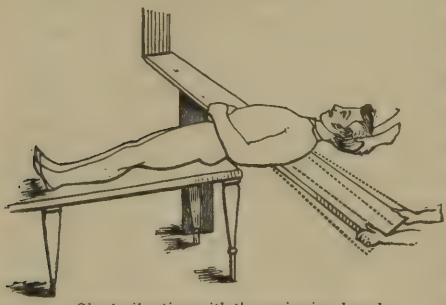
Vibrating the chest by the arms.

At the same time, blood is thrown into the arm, as in swinging them. The effect is agreeable, and almost any patient can take

it, for it can be made mild or severe at will. Slight traction should be made at each hand during the shaking.

Fig. XXVIII. represents another method of chest-vibration, and, perhaps, a more effective one than either of the preceding. A board, about ten feet long and one foot wide, has one end fastened to the wall, and two or three feet from there it rests across a support. The patient lies with the lower part of the body on a bench of the same height, and with the chest resting (on a cushion) on the long part of the board, towards the end; the head is supported by the hands of an assistant. Another assistant then shakes or vibrates the free end of the board, which, being made of springy material—spruce is best—sends a succession of small vibrations into the patient's chest. The instrument is hung on hinges, so as to be turned up against the wall when not in use.

FIG. XXVIII.



Chest-vibration with the springing board.

§ 65. In making up a prescription for a consumptive patient, not only the pulmonary disease, the contracted chest, imperfect circulation, &c., must be taken into consideration, but all other derangements and symptoms must be attended to. For instance, as stated previously, there are generally more or less dyspeptic symptoms; and often, especially in the last stages, troublesome chronic diarrhœa, &c. Now the treatment must have reference to these conditions, as well as to the principal disease, and thus the prescription will be modified accordingly, according to principles previously laid down. I have illustrated the general character of the treatment to be employed in these cases, but it should not be considered as a formula for them. It should be remembered that the treatment under consideration does not take the place of, or in any way interfere with the ordinary exercises of the patient; if anything, it enables him to take more than without it. It is not necessary here to urge the necessity of plenty of out-door exercise—such as he can bear, riding, pleasant society, good food, and other hygienic measures—for the

profession has come to regard these as of more importance than all other means hitherto resorted to. The movement cure is simply a powerful and often a saving aid to all other hygienic means.

§ 66. A consumptive patient, under a carefully prescribed and administered treatment by movements, exhibits, to an observing physician, some interesting phenomena. The rapid, wiry pulse gradually falls and becomes more soft and natural. A patient with a pulse at one hundred before the treatment began, will be found to have it at ninety, or even less, at the end of the hour. The hands and feet grow warmer, and, as the strength increases, the night-sweats gradually disappear. There are no sudden changes, but, in a few weeks, they find themselves decidedly better; can take more exercise, and with less fatigue; sleep and eat better, are more hopeful, and, in all respects, are much improved—even those cases that ultimately succumb to the disease. But very many cases, taken in the early stages, may entirely recover.

§ 67. There is one consideration that, it seems to me, should have some weight, in accounting for the benefit derived from this treatment in this disease, and especially in what is ordinarily denominated scrofula. The lymphatics have no central organ to propel their contents forward, like the heart, but depend entirely on capillary attraction, especially that force in the tissues behind them, the result of affinities exercised there, throwing a certain amount of waste into the lymphatic vessels and the pressure of muscular contraction upon these vessels propelling along their contents. Now, any cause that lessens the affinity between the blood and the tissues, and that lessens the tonic condition of the muscular fibre, must cause more or less stagnation in the lymphatic vessels, the condition in scrofula. And, of course, any treatment that tends to restore this affinity between the blood and the tissues, and restores a tonic condition to the contractile tissue, *must* have a good effect upon consumption and scrofula, besides the increased oxydation and hæmatosis.

§ 68. I am aware that consumption is considered, by many, to be a condition of *increased* oxydation of the tissues, and treatment is resorted to to *prevent* this alleged increased oxydation. For instance, the good effects of cod-liver oil is accounted for, they say, by supposing that it prevents the destruction of the

tissues, by supplying other material for the support of animal heat, &c. But this view ignores the fact that *too little* oxygen enters the system through the diseased lungs; that the patient is always benefitted by open air and exercise, which bring more oxygen into the system, that the blood itself is pale for the want of oxygen, and the assertion of Lehmann, which has never been controverted, that "*there is no disease characterized by too great oxydation of the blood.*" I believe that consumption is principally characterized by deficient oxydation of the tissues, and that the benefit to be derived from exercise in general, and the treatment under consideration in particular, depends, in an important degree, upon the facilitation of transformation of tissue, and the introduction of oxygen, to be used in making tissue of a higher vitality.

PARALYSIS OF MOTION.

§ 69. Muscular motion takes place only in consequence of a stimulus imparted to the muscular fibre through the medium of the nerves, and paralysis of motion occurs generally, *not* from defect in the muscular tissue itself, but because of an interruption of this stimulus. Paralysis is, therefore, a disease of the nervous system, and paralysis of innervation, might, perhaps, be the more appropriate expression. The cause of this interruption of the passage of the impulse of the nervous centres to the peripheric nerve-loops, in contact with the muscular fibre—which is the normal stimulus to muscular contraction—may be either mechanical, as the pressure of a clot or effusion, with or without rupture of the vessels, effusion of serum into any of the cavities, concussion from blows, &c., or it may be physiological—as the cutting off of the supply of nutrition, from chronic inflammation of the membranes, thus interfering with the capillary circulation in the nervous substance; or, disease of the nervous tissue itself, as softening, tubercular deposits, &c.; or, both the mechanical and physiological causes combined. There are also, probably, some rare instances of this affection involving the "peripheric brain," or ultimate extremities of the conducting nervous fibres. While the prognosis, in cases of paralysis of motion, should always be guarded, it should be governed less by the degree of paralysis than by considerations of the character and seat of the

lesion in the nervous system. A slight degree of paralysis may be very intractable or wholly incurable, while some cases of complete loss of power may very nearly or perfectly recover by proper treatment, and sometimes, indeed, spontaneously. While a certain amount of obscurity must necessarily attend these cases, yet it is of the utmost importance that great pains be taken to secure a correct diagnosis. The difference in the curability of different cases, depends very much on the early history of each case. A disease in the cerebral hemispheres, for instance, may slowly progress for years, till a comparatively large portion of the substance of the brain has become implicated, and yet no violent symptoms occur, but a gradual debility comes creeping stealthily over certain portions of the body. So insidiously, indeed, does this often happen, that the patient himself is almost unconscious of his malady till it has already existed for some time. Evidently such a case, with the disease inducing the paralysis still progressing in the nervous centre, is much more formidable, though attended with but a slight loss of power, than in a case of an opposite character, where the system is overwhelmed by the *suddenness*, rather than the extent of the lesion. A very small clot may produce complete hemiplegia, while cases have been known where extensive abscesses have occupied a portion of the brain, attended by much less paralysis; the former have a good chance of recovery, while the latter are necessarily incurable. Still, the obscurity previously mentioned, and the difficulty, often encountered, of getting the exact history of the case, render it proper that each case should have the chances of a trial.

§ 70. The fact that the paralysis is often disproportionally greater than the lesion—and this occurs in the majority of cases—leaves a large amount, in many cases the *whole* amount, to be accounted for as entirely *functional*, and should be considered separately from that immediately produced by the organic disease. While we cannot hope always to remove the organic lesion, the functional paralysis may be entirely removed; and, in those cases where the totality of the symptoms depends entirely upon a continued interruption of innervation, from a previous powerful impression or shock upon the nervous system, the paralysis will be removed, although the organic lesion may pos-

sibly remain unaltered. Or, in less favorable cases, the improvement will continue up to the point of actual interference of the organic lesion with the transmission of the nervous force. But this is not all, for it fortunately happens that the very means pursued to remove that portion of the paralysis due to functional derangement of the nervous system, is also highly conducive to the removal of the original organic disease.

§ 71. It is well known that restoration of impaired nerve-function, as well as restoration of impaired nerve-tissue, takes place very slowly.

Even the slight pressure of the fingers on a nervous trunk, as of the ulna, where it passes over the internal condyle of the humerus, will so far paralyze the little and the ulnar side of the ring-finger that several minutes elapse before we can get complete control of them.

Should this pressure be continued a certain length of time, the paralysis would doubtless be more or less complete, though the nervous tissue might remain perfectly intact. Now, there are various ways in which paralysis of motion may exist, and be continued indefinitely, without organic lesion in the nervous centres, except so far as imperfect nutrition always accompanies a loss of function. Any cause, local or general, capable of overwhelming the nervous centres, may produce paralysis, and, when once produced, though the cause be removed and no organic lesion remain, the paralysis may continue; because the function, once lost, is with difficulty reëstablished, owing to the low nutrition in the nervous tissues while the cause existed, which, when the cause ceases, still renders volition impossible, and without which performance of function there can be no improved nutrition; for it is by the performance of function that the nutrition of every organ takes place. Then we often meet with paralysis of a limb, in children, which continues through life, though robust health may have followed the fever or other disease producing it. Many cases also recover, but not until the corresponding member on the other side has got the start of a year or two in growth. Also, cases of paralysis, arising from Pott's disease of the spine, frequently recover after anchylosis has taken place, and the pressure from effusion removed, or the inflammation has subsided.

§ 72. That the destinction between the paralysis due to the organic lesion, and that depending on functional derangement of the nervous system—the latter, it is true, set in train by the former, but still distinct from it—is well founded, is illustrated in what is denominated "hysterical paralysis." A lady suddenly loses her voice, or even is attacked with paraplegia or hemiplegia, which often lasts for months, but is not caused by the slightest organic difficulty in the brain or cord. It is entirely functional, but none the less real on that account, though, of course, much less dangerous. Still, a shock has been produced, though we may not be able to tell what produced it; and, when once produced, it continues to exist as an independent condition. The same may be the case when the paralysis has been produced by a more appreciable cause. Cases 2, 4, 19, and 3, in the tabular statement on page 88 are samples of absolutely perfect restoration; in one case (2), after a lapse of over five years from the time of the accident. At that time, there was probably compression of the brain, and perhaps a clot; for the child was comatose for several days, and, I think, for more than a week. For a year or two before commencing the treatment, the paralysis had increased; but, as the recovery was perfect, it cannot be supposed that the original organic lesion existed up to the time of commencing the treatment.

Another case illustrates, if possible, still more forcibly this view, because it is one in which we are cognizant of the character and extent of the original disease. Master D. F., now ten years old, five years ago was kicked by a horse in the right fronto-parietal region—a portion of the skull, about three inches long by two and a half wide, being detached and forced under the adjacent portion of the skull, projecting into and lacerating the substance of the brain. It was removed with great difficulty. Unhealthy granulations, and even an abscess formed on the exposed portion of the brain, and, after a tedious convalescence, in one year the wound had healed. He was not trephined. After the accident, he remained comatose for twenty-four hours, when, consciousness returning, it was ascertained that there was complete hemiplegia of the left side. At the end of a year, he could walk, and continued to be able to do so up to the time I saw him, five years after the accident. But he

could not sustain his weight on that leg;—the development of the whole side was very much retarded, the *bones* as well as the muscles of the left side being much smaller than on the right; the left arm was nearly useless, and, though he could move it about in most directions, there was not the least control over the hand and fingers. The fingers were flexed into the palm, and the wrist upon the forearm. For the last year he had been getting considerably worse. His intellect was unimpaired. After three months' treatment, there was a wonderful change for the better. He could use the hand and arm to climb a ladder with great facility, and he was even beginning to feed himself, being able to grasp a fork; his form had changed, being perfectly upright, instead of stooping and favoring the left side in every movement, and he now walked with only a slight hitch. This case is interesting, because we know that while there has been a remarkable amelioration in the patient's condition—an increase of power in the paralyzed side, of several hundred per cent.—there cannot have been the same change in the original lesion. Indeed, as there only remains the cicatrix, it is not likely that there has been the slightest alteration of the condition of the brain. This case still continues treatment.

But there are also positive indications for treatment, with reference to the organic disease, as will subsequently appear.

§ 73. But, whatever may have been the cause of the paralysis—whether effusion into any portion of the cerebral mass, inflammation of the membranes of the chord or brain, the shock of violent disease or other cause—the first indication is, of course, to ascertain the cause and remove it.

Unfortunately, in most cases, even the proximate cause lies beyond our reach, except by indirect means. Where the access of the disease has been gradual, the treatment may cautiously commence; but, in recent cases, especially if they are severe, much treatment of any kind is to be deprecated. The nervous system is already overwhelmed by the force of some powerful shock, and, till it has had ample time to recover, and has recovered so far as it is capable of reacting, any efforts to act on or through it will be in danger of doing harm instead of good.

The rule that surgeons apply to cases of severe injuries, before performing an operation, is equally applicable here. We must

wait for reaction to take place. It may be several weeks or several months, according to the nature of the case and the recuperative powers of the system.*

Whatever may be the utility of medication in some stages of this disease, I regard the exhibition of strychnia in the first stages of paralysis, goading up the nervous system, already completely exhausted, as being particularly harmful. (See note page 84.)

It adds nothing to the capacity of the nervous system, while it still more completely overwhelms it. But every hygienic means should be brought to bear in the first stages of this disease. Special attention should be paid to the diet. Paralytics are very apt to live badly, taking altogether too much food to be properly disposed of in their confined condition; they often eat to surfeit, without being aware of it. There is also great deterioration in the quality of general nutrition, interstitial change taking place much more slowly, and much less perfectly —so much so, that the odor arising from the body and breath of paralytics is precisely like that of very old persons. Even the expression of countenance and intellectual manifestations have the same senile character. Oxygen is the great purifier, and the patient should be kept in the purest atmosphere, frequently changed, and allowed to come in contact with the skin to yield its tonic effect to that organ, in order to excite respira-

---

* In a clinical lecture, by Professor Trouseau, inserted in the *Gazette des Hôpiteaux*, we find the following:

"As a general rule, M. Trouseau does nothing in cerebral hæmorrhages. He does nothing, because he regards cerebral hæmorrhages *as an accomplished fact*, and he does not see how a medicine can be useful when there exists a hæmorrhagic principle (tendency) in a corner of the brain. He asks, What can bleedings, purgatives, or cuppings accomplish against the pressure of a foreign body—a clot on the brain? Blood-letting, they say, has the effect of depleting the sanguineous vessels, and, in depleting them, we also weaken the absorbent vessels, and thus favor the resolution of effused blood. But ecchymosis of the brain should not be treated differently from ecchymosis of the skin or cellular tissue. But, when a man has received a violent blow upon the head, or when a child has fallen and bumped his forehead, we limit our treatment to external applications of salt and water, or make light compression, or, better still, do nothing at all. Resolution takes place as well, or better than if we had done something."

M. Trouseau's success, since adopting this course, has been much better than formerly.

tion; and tepid spongings of the body will be found useful for the same respiratory purposes, as well as for cleanliness. Of course, such special medical treatment as is indicated by the present condition of the case—as, for instance, to cause absorption of an effusion or clot, to attend to the digestive and depurating functions, to support the strength, &c., by any means best calculated, in the physician's judgment, to accomplish these purposes—should be employed at this stage of the disease. In the absence of the pressure of muscular contraction, œdema of the extremities may be relieved by frequent kneading with the hands and pressure on the soft parts; but, in cases accompanied by spasmodic action of the muscles from reflex influence, it is not common to find œdema. But, besides plenty of pure air, no more plain food than can be vigorously digested and properly assimilated, and whatever may be embraced in general hygiene, there is very little that can be done, in recent cases, without danger of injury, until the system begins to react from the shock. Even without treatment, or in spite of treatment, many cases do react, and after a while entirely recover; but the great majority of cases convalesce to a certain degree, and there stop. It seems impossible, with the treatment usually adopted, to get them beyond a certain point.

§ 74. But, suppose the system has had time to react after the inception of the disease, or suppose the progress is gradual, the patient becoming conscious of having less and less control over certain members, what are the indications of treatment? The principal indication evidently is to reëstablish the connection between the muscles and the brain. This is to be done in the same manner that it is done in health, viz., *by the use of the muscles.* In health, every movement makes the next movement possible. In paralysis of motion, how shall the first movement be accomplished? After long inaction—first from disease, and subsequently from habit—how shall volition be communicated from the central to the peripheral brain? Let us follow nature.

The object is a definite movement; the means are muscular contractions; the cause is the will. We attempt to accomplish this, first, by a process of exclusion; that is, we exclude all other movements while attempting to perform the required one; and not only that, but the attempted movement must be accomplished in every case without a single failure.

Suppose a case of hemiplegia. The patient has no ability to raise the arm; and not only that, he has lost even the power to try. No person can attempt anything that he *knows* he shall be unable to perform. So that his volition, with reference to his paralyzed side, if not entirely gone, is reduced to its minimum quantity. A simple effort of the will, at the physician's request, does, in such circumstances, but very little good. An effort of the will, to be of any service, must be recognized in the peripheral as well as central brain. How can the peripheral brain be made to recognize volition, so as to impart its stimulus to the muscular fibres with which it is in contact? In the first place, the patient must be placed in such a position that all voluntary muscular motions to keep himself in position will be avoided; he must be either lying or half lying, and in such a manner that, being supported in all directions and perfectly comfortable, he will employ no other muscles than those belonging to that portion of the paralyzed side which it is determined to act upon.

§ 75. For instance, suppose we wish a flexion and extension at the elbow. Having placed the patient in the position above described, we take the paralyzed arm in our hands, and, extending it horizontally, rest the arm firmly against our thigh, holding it firmly with one hand, while, with the other, we grasp the forearm near the wrist. It will be remembered that the patient is in such a position that neither innervation nor arterial blood —both of which are necessary to muscular contraction—will be diverted to any other part by any other movements. This is very important to remember in the treatment of this disease; for if, at this stage of the treatment, other movements are going on at the same time, the volition will be diverted from the paralyzed muscle to those more easily affected and already occupied, thereby seriously interfering with the intended movement. Now tell the patient to bend the elbow very slowly and very gently, and not to exert all his power in the effort. We are supposing a case of complete loss of voluntary motion. It is well known that if a man in perfect health should exert all his available force in a single effort, or succession of efforts, the consequence would be a diminution of power, and even a decrease in the size of the muscle, rather than an increase of them. The same rule will apply as much more forcibly to the paralytic, as

his fund of available force is less than in the healthy. In commencing the treatment, the object is to direct volition to a particular group of muscles, and no where else at the same time, in order to obtain the maximum amount of muscular contraction with the minimum expenditure of force; but, as in health, where a succession of such efforts are to be made without fatigue, so here only such an intensity of volition is employed as can be repeated a certain number of times, with equal force, without exhaustion. In order to guard still further against the ill effects of too great effort, only three or four are made at one time, when the patient rests. Eight or ten different movements, given at one sitting, are enough for one day. By doing a little, we accomplish something; but, by over-doing ever so slightly, we destroy all the benefit that preceded.

§ 76. At the first moment that this effort is made by the patient, without waiting to allow him to see whether or not the forearm moves, the arm is to be carried in the required direction, as though the flexion had been done voluntarily. Thus we have an effort concentrated upon a particular part, and a movement following the effort, though as yet not as a consequence of it. But something certainly has been accomplished, even in the muscular tissue. In the flexion of the limb there is the stretching of the extensor muscles, and the mechanical contraction of the previously stretched flexor muscles, as in health; both affecting somewhat the capillary circulation, and making some impression upon the peripheral nerve-loops, sending in turn at least a reflex influence toward the central brain, thus doubling the effect of the movement. The effort, though gentle, should be concentrated, well-sustained, and determined, in order to accomplish which, the will of the operator should always operate through the patient. It is not enough that the patient be told what he is to do, and then be left to do it as well as he can—for inability to do this is the essence of his disease—but, in every thing he does, he must act only under a command. A kind, but determined command is followed by an increased desire, which is the most favorable condition for an effectual volition, because a volition thus begun commences at its maximum power, and continues full and well-directed to the end. Although the operator himself actually makes the movement which is percep-

tible to the eye, namely, the flexion of the forearm in the case supposed, it is more to secure the *morale* of the patient—for he sees it move while he is trying to move it; he cannot tell how much of the movement belonged to himself, but feels and hopes that he helped some; and, as his effort was slight, perhaps he could do more. Yet, in all hopeful cases, there probably is a certain amount of contraction resulting from every effort, but, being insufficient to make the sensible motion, it ordinarily is not appreciated. This usually unseen and unknown penetration of the will into the tissues, toward which it has been sent, and the hope of being able to increase it, constitute our basis of expectation.

§ 77. Suppose a force of two pounds of muscular contraction to be capable of raising the arm; if we began with a force of only one ounce, it might be increased to thirty-one ounces, and still the arm remain unraised; but the most hopeful change has been going on in the nervous and muscular tissues, while yet there is no palpable result. If we have formed the habit of obedience in a few muscular fibres, this habit and the increased nutrition resulting from this functional act may, in time, extend to others, till the normal condition is fully restored. We may avail ourselves of still another means of assisting volition to accomplish its purposes. I allude to the dual arrangement of the organs, and the tendency to symmetrical development. Now, if the patient be made to bend both the sound and the paralyzed limb at the same time, and in the same manner, taking care that the will be equally intent upon both movements, it will increase the tendency to contraction in the palsied muscles to follow the effort. But such movements should be used only a part of the time. I have mentioned that innervation and muscular contraction take place under the influence of arterial blood. The will exerts a powerful influence upon the circulation, increasing it in the parts towards which it is directed. This is another reason for the gentle and continued effort, thus allowing time for the circulating fluids to arrange themselves under this stimulus. But mechanical means may sensibly aid in effecting this result. During the cessation of voluntary motion, the circulation in the capillaries becomes enfeebled, and increased exosmosis of the fluids takes place through the distended walls of the vessels; the stagnant

blood becomes more venous than arterial, and is infrequently purified by being brought into contact with the oxygen of respiration, owing, in a great measure, to an absence of the mechanical pressure to which the contents of the capillaries and other fluids are subjected, during health, by the contraction of the muscles containing them. This mechanical aid may be partially supplied from without, by means of pressure of the hand, and kneading of the muscles with the hand and fingers. The retarded circulation that may thus be accelerated in passing to the heart and lungs, would be laden with impurities, to be eliminated at the proper emunctories. To carry out our attempt to imitate nature, and follow her method of substituting a physiological for a pathological condition, we endeavor to induce an arterial condition of the capillaries by stretching the palsied muscles, or kneading them while in an extended position. Reflex action is to be avoided, because contractions produced in this manner, being entirely abnormal, seriously interfere in establishing the control of the will, which is the object aimed at; but direct action may be stimulated, in some cases, by gentle pressures along a nerve-trunk, or on a plexus of nerves, slight percussion along the spine and over the sacrum, &c.; but these stimuli should never be used where there is reason to suspect organic lesion of the medulla-spinalis. It is a remarkable fact that though organic disease of the cord is a hopeless disease, yet, being characterized by frequent spasms of the muscles, it is not attended by that wasting away of the muscular tissue that usually follows paralysis unaccompanied by such reflex contractions, though the latter justifies a much more favorable prognosis. Muscular contraction, though abnormally produced, favors the circulation and nutrition in this tissue, though the exigencies of the case prevent the penetration of the will beyond the seat of the lesion. But spasms of the muscles, accompanying resolving or functional disease of the nervous system, do not seriously interfere with the treatment or the progress of the case.

§ 78. The foregoing remarks are applicable to complete paralysis of motion; but, in those more favorable cases of partial paralysis, where the will has regained, or has never been deprived of a portion of its control of the muscles, the principles of treatment indicated in complete palsy are equally applicable,

with the addition of another method of still more perfectly concentrating the will upon the designated muscles. As the first method may be called the process of exclusion—that is, excluding the system from participating in any other movements—so this may be called the process of concentration, or concentrating all other muscular efforts of the whole body upon the designated member which shall be cumulative in the palsied muscles. There being still some power in these muscles, such movements, besides those previously explained, may be given as require contractions in other muscles besides the affected ones; but, how feeble soever the contraction of the affected muscles, the contraction of the other muscles, be they ever so remote, should always be *less* than in the affected ones, and should be such as are necessary to complete the contemplated movement. For instance, in hanging by the hands, it will be seen that, from the necessities of the case, all muscular efforts in all parts of the body are rendered necessary from the position, and that the force of contraction gradually increases from below upwards, and is the most intense in the hands and arms. And, as the volition and contraction converge towards the upper extremities, so do the innervation and circulation flow in the same direction. This is what I call a *cumulative* movement. But the same care should be taken to avoid fatigue, as in the first case, and all through the treatment this idea of calling out only so much force as can be easily and pleasantly borne, and the depression consequent on which effort can be quickly rallied from, and that leaves no exhaustion behind, should be kept in view.

§ 79. In paralysis of motion, the principles just laid down should govern the construction of every prescription of movements. But there are other indications that may be responded to by the use of movements. Those cases of paralysis that arise from congestion of the dura-mater, or any abnormal nutrition of the membranous envelops of the cord, will have this morbid nutrition diminished by inducing a higher nutrition in the contiguous muscles of the back. This may be accomplished by various flexions of the back in different planes, such as will bring the dorsal muscles into action; at the same time the movement acts directly on the cord itself, through the ligamentum-

dentata, thus supplying a healthy mechanical stimulus to the cord. But we should not make any of the above-mentioned movements till we are sure of a good circulation in the extremities. Indeed, a peripheric circulation once thoroughly established, central congestions will be proportionally lessened. This may be attained principally by movements on the unaffected portions of the body, such as will promote an arterial circulation in the extremities.

Some of the most annoying symptoms in cases of palsy are connected with the bowels and urinary bladder. Paraplegia is almost always connected with constipation of the bowels and incontinence of urine. The constipation is often so severe as to require large doses of the most powerful cathartics to effect an evacuation of the bowels, which, being repeated every few days, seriously interfere with the patient's chances of recovery. The constant liability in some cases to, and the annoyance and inconvenience of, involuntary urination is a great source of depression and discouragement to the patient. The treatment for these cases is so simple that many might refuse to employ it, but the efficacy of which is fully confirmed by experience.

§ 80. In constipation depending on paralysis of the nerves controlling the motions of the lower bowels, and the sphincter-ani, the treatment must be adapted to this indication. We must act through the capillary circulation and innervation of these parts. This may be done by acting by mechanical means from without inwards. Let the patient be laid on his back, his arms stretched up over his head and held by an assistant; then, with both hands laid flat on the abdomen, make a rapid shaking or vibration of the abdomen and its contents. This may be followed by kneading with the fingers along the course of the ascending, transverse, and descending colon, pressing deep down into the tissues. If spasm of these muscles should follow the vibration, then the arms need not be raised over the head, or the knees can be raised and held by an assistant, or the shoulders can be elevated, the object of which will be to relax the muscles of the abdomen; but the treatment in that case will not be so efficacious as if applied over the extended muscles. Also, in the same position, the legs may be raised by the patient himself, bringing the abdominal muscles into action. For paralysis of the bladder

and sphincter-ani, the thighs are held flexed upon the trunk, and a vibration is made with a blunt stick upon the perineum. Gentle percussion across the hips, from one trochanter to the other, and slight pressures along the sciatic nerve, where it issues from the pelvis, will stimulate the nerves given off to the lower bowels.

This simple local treatment, with the general tonicity induced by the general treatment, has been sufficient hitherto in my practice to overcome the worst cases of paralytic constipation and incontinence of urine. Where there is troublesome spasmodic action of the muscles, this is best overcome by very slow bendings of the joints, while the patient remains perfectly passive. The spasm which the muscles at first take on, upon being put to the alternate stretch and relaxation, will gradually subside as the nerves become accustomed to those impressions so nearly resembling normal contraction. Where there is spasmodic action of the muscles following an effort, the volition being divided, as it were, and scattering to different muscular groups in remote parts, great pains must be taken to concentrate the will upon the designated member. Indeed, in many of these cases, nothing but the greatest tact, patience, and perseverance can effect a cure.

§ 81. Of course, a treatment like that which I have just endeavored to describe, acting entirely on the general and local nutrition, through functional manifestation, implies a certain amount of time and considerable patience; yet, considering the nature of the disease, the progress in some cases is remarkably rapid.

Dr. Batchelder, in his excellent report of cases of paralysis treated by him with *exercise* in the New-York Hospital, mentions the difficulty he found in inspiring these sufferers with sufficient ambition, and that they were generally satisfied with slight improvement, and refused or neglected to make further effort. Now, I never have encountered any such difficulty, but rather the contrary. Making due allowance for the difference in the character of my patients from those to be found in hospitals, yet I think it was mainly owing to the exhaustion following the kind of exercises that his facilities allowed him to contrive for them, though he seemed sensible of the injurious

effects of over-doing. Greater precision and less effort have an encouraging effect upon the patient's mind, especially when he sees, day by day, that he can do many little things that before were impossible.

§ 82. Electricity has been a good deal used in the treatment of paralysis, and even now almost all physicians resort to it when other remedies fail, as though the last hope lay in its employment; but it seems to me without sufficient reason either in experience or philosophy. I know it has been held by respectable members of the profession, and is now largely entertained by certain among lay people, that the nervous system is a sort of galvanic battery; that the nerves are electric conductors, and that innervation is the conduction of electricity. And where these views are not entertained, there seems to be a sort of tacit acknowledgment that electricity somehow ought to be good for paralysis, if we only knew how to administer it. Let us look for a few moments at the scientific bearing of the electrical treatment, for it is one of those means that charlatans seize upon to prey upon the credulity of the public, to the detriment of legitimate medicine.

Innervation is an organic functional act, subject to the same organic laws of waste and repair of the tissue performing it as all other manifestations of function. This we know by the large amount of phosphates and other constituents of nerve-substance to be found in the urine after excessive mental exertion, fright, hysteria, &c., the same as urea is thus found after great muscular effort. A little reflection will discover that there is much less analogy between the nerve force and electricity than is commonly supposed. The idea of *supplying* it to the system is even more absurd than the supposition that, because India rubber and muscular tissue are both elastic under certain circumstances, the former can be substituted for the latter! Besides, this idea of *introducing* electricity ignores the manifest qualities of this imponderable agent itself. Electricity is not an entity—a substance that can be poured into or through anything, like a fluid, but it is a *condition*. Polarization in solid conductors, and electrolysis and decomposition in

fluid conductors, is all there is of what is called the passage of electricity, and there is no more scientific reason for supposing it would be remedial in any manner whatever than any other chemical agent. And as organization in the nervous substance is necessary to its restoration, and as the conduction of electricity is chemical change or disorganization (electrolysis), diseases of the nervous system would seem to be illy adapted to the employment of this remedy. And such I believe to be the case.

Dr. J. C. Dalton, in his admirable "Treatise on Human Physiology," just published, shows that various other agents, mechanical and chemical, besides electricity, will cause muscular contraction; that there is no electrical current in a nerve excited by electricity, which excitation is due entirely to its power of producing mechanical or chemical irritation; and that nothing so quickly exhausts the natural irritability of the nerve as electricity. This is so much so that, while nervous irritability remains for several hours after death, in ordinary cases, yet it is wholly wanting in animals killed by electricity. In experiments on dead animals, instead of the nervous irritability and muscular contraction continuing longer under the use of electricity, as it should do if this theory of its use is correct, it very speedily disappears altogether. This is not to say that electricity may not be a valuable remedial agent, but the genius has yet to arise that shall place its employment upon a scientific basis. When the cause of the paralysis is unmistakably muscular, as where there is retraction or relaxation of the elastic and muscular tissues; or when there is any reason for wishing to modify the quality of the fluids and the organic processes in the cell formations in the mass of the tissues, then electricity may be employed, within certain limits, to advantage. The chemical change occurring with the passage of electrical currents affords a certain amount of stimulus that may be salutary while not extending to lesions in the nervous system, where we cannot afford to make cause for repair beyond that occurring as a part of its own functional manifestation.

Dr. Robert Bentley Todd, an authority whom none will dis-

pute, in his "Clinical Lectures on Paralysis and Diseases of the Nervous System," on page 152, says:

"You will often be consulted as to 'some expedient for promoting the restoration of the paralyzed limbs to their normal condition.' To this question, after having given a fair trial to the various means which have been proposed for this purpose, I must reply, that I know of nothing which more decidedly benefits the paralyzed limbs than a regular system of exercise: active when the patient is capable of it, passive if otherwise. As to the use of electricity, which is now much in vogue, or the employment of Strychnia, which has been recommended, I feel satisfied, as the result of a large experience, that the former requires to be used with much caution, and that the latter is apt to do mischief, and never does good. I have seen cases in which, after the employment of electricity for some time, that agent has apparently brought on pain in the head, and has excited something like inflammatory process in the brain. And so Strychnia also will induce an analogous condition of brain, and will increase the rigidity of the paralyzed muscles. Some good may occasionally be effected by the use of friction, or cold water, or shampooing, all of which tend to improve the general nutrition of the nerves and muscles."

§ 83. The following cases, which have been reduced to the tabular form for conciseness of statement, comprise *all* that have applied for treatment from January, 1857, to March, 1859, and show the relative curability of this affection in its different forms, by the treatment under consideration. Among these twenty cases, are several where from the first there seemed no hope of success, and which will hereafter be rejected; but it was deemed advisable to test the virtues of the treatment, by applying it in the worst cases as well as where there was greater probability of success. Even in these worst cases, as Nos. 9, 18, &c., that had been given up as hopeless for years, great improvement was often realized.

But when cases, like several in the list, experience a complete restoration of all of the lost functions—after, perhaps, several years of nearly suspended animation, reformation of muscle and its connecting tissues, and a sensible increase of even the bone itself taking place—it exhibits a power of controlling and directing the nutritive processes unequalled by any other therapeutic means.

One thing has been quite noticeable, viz.: all other things being equal, the benefit has seemed to be very much in the inverse ratio of the amount of treatment previously received.

Cases.	Patient's Age.	Since the first Attack.	How long under Treatment.	Probable Cause.	Patient's Condition.	Results of Treatment.
1	10 years.	1 year.	2½ mos.	Pott's disease of spine.	Partial hemiplegia and loss of sight of one eye.	Perfect restoration.
2	7 years.	5½ years.	2½ mos.	Fell from the bed to the floor when one and one-half years old.	Complete hemiplegia at first; restoration in one year, except the right leg, which was "withered;" foot deformed; could walk with difficulty; no voluntary motion below the knee.	Perfect restoration of function; foot perfectly in shape.
3	12 years.	6 years.	8 mos.	Cerebral inflammation.	Paralysis of the left arm; could use the fingers a little; no power over the upper arm; fore-arm supinated.	Restoration, except of the deltoid, which was atrophied.
4	14 years.	6 mos.	5 weeks.	Dislocation of the elbow.	Paralysis of the right arm, especially of the fingers, which were flexed.	Perfect restoration.
5	36 years.	2 yrs. and 4 mos.	4 mos.	Obscure.	Complete paraplegia, with slight improvement after first attack; no control of sphincters; inveterate constipation, and incontinence of urine; could not stand, &c.	Remarkable improvement; perfect control of the sphincters; bowels regular; walks about with canes.
6	40 years.	year.	7 weeks.	Tapes-dorsalis.—Has had syphilis.	Paraplegia; could merely crawl; great stiffening of the limbs.	No improvement.
7	5 years.	2 mos.	8 mos.	Pott's disease of the spine in its active stage	Complete paraplegia soon after commencing treatment.	No improvement of paralysis; but general health much improved, to which indeed the treatment was principally directed. One year since he is a little better. He will probably recover as anchylosis takes place.
8	45 years.	3 years.	2½ weeks.	Syphilitic meningitis.	Paraplegia.	No improvement.

Cases.	*Patient's Age.*	*Since the first Attack.*	*How long under Treatment.*	*Probable Cause.*	*Patient's Condition.*	*Results of Treatment.*
9	44 years.	23 years.	3 mos.	Fell upon the curb-stone 23 years ago	Has not walked since the accident; attempts at movements attended with clonic spasms.	Improved in all respects; obliged to suspend treatment while still improving.
10	38 years.	2½ years.	1 mo.	Obscure. Addicted to smoking.	Partial hemiplegia; could walk with crutches.	Much improved; especially in the use of the right hand.
11	22 years.	1 year.	3 mos.	Probably small clot in the left cerebral hemisphere.	Partial hemiplegia; could do business.	Considerable improvement.
12	74 years.	1 year.	3 mos.	Apoplectic attack.	Could walk with difficulty, dragging the right leg. Not the slightest use of the right arm; fingers flexed into the palm.	Great improvement. Walks with ease and naturally up and down stairs alone, and can use the right arm a little.
13	13 years.	11 years.	2 mos.	Unknown.	Nearly complete paraplegia.	Slightly improved.
14	45 years.	2½ years.	2½ weeks.	Syphilitic.	Paraplegia; could walk with assistance.	No improvement.
15	43 years.	1½ years.	1½ mos.	Syphilitic.	Paraplegia.	No improvement.
16	36 years.	1¼ years.	5 weeks.	Syphilitic.	Complete paraplegia. Had not sat up for four months; alvine discharges passed involuntarily; incontinence of urine.	Much improved; can control alvine discharges, and sit up, and move the limbs.
17	21 years.	8 years.	10 mos.	Uncertain.	Atrophy and retraction of the muscles of back, thighs, and hips.	Very great improvement.
18*	10 years.	5 years.	3 mos.	Kick of a horse.	Hemiplegia.	Great improvement. Atrophied muscles vivified, &c. Continues treatment.
19	47 years.	1 mo.	2 mos.	Obscure.	Hemiplegia, which passed off in a few days, leaving great weakness and numbness in the affected side.	Perfect restoration.
20	50 years.	2 years.	2 mos.	Some affection of the cord.	Paraplegia; could walk about with canes.	Marked improvement. Continues treatment.

* This case is related on p. 73.

§ 84. The common idea that apoplexy is more likely to occur in peculiar constitutions, having what is called the "apoplectic diathesis," does not seem to be borne out by the facts. Indeed I do not believe there is such a *diathesis* as the "apoplectic." Out of about thirty cases, not more than two or three exhibited any approach to the short neck and plethora supposed to be favorable to paralytic attacks, but the majority were rather the opposite, being spare and ænemic, rather than short and plethoric. The conditions favorable to the disease seem to be disordered nutrition, the quality rather than the quantity of the blood, and especially an unhealthy condition of the vessels—ætherometous deposits being found wherever a rupture can be traced. It is true that "good livers" sometimes have apoplexy, but it is more probably because their habits deteriorate the processes of nutrition than that they are "too well nourished"—an impossible occurrence.

While the treatment above set forth aims primarily to reëstablish the function of the nervous system, it at the same time tends to promote a more perfect nutrition in all the tissues, thus lessening the probabilities of recurrence of the original disease, of which there is always more or less danger. And it is an interesting and gratifying fact that *not one* in the above list has ever had an increase or even exacerbation of the disease since the first commencement of the Movement Cure Treatment. These cases had all exhausted every other means, as a consultation of the column to "time since first attack" will at once suggest.

LATERAL CURVATURE OF THE SPINE.

§ 85. The pathology of uncomplicated lateral curvature of the spine is exceedingly simple. It is invariably produced, in the first instance, by *unequal action* of the muscles; generally, but not always, accompanied by weakness.

The spinal column consists of twenty-four vertebræ,—little blocks of bone, piled one on top of the other with the intervertebral cartilage, as elastic cushions between each, and all held strongly, but not immovably together, by the various

ligaments; the whole forming a very flexible column, with little power to sustain itself in the upright or any other position in which is may be placed. The spinal column is necessarily so formed, in order to allow flexion in every direction, as to accommodate the various motions of the body, and to secure pliability and elasticity in connection with firmness and strength—qualities, in this particular instance, necessary to coëxist in the same organ: the latter to enable it to sustain the burdens imposed upon it, and the former to secure immunity from shocks and the operation of counter forces. The muscles of the trunk, secured to the pelvis below as a base, are attached all along the spine as guy-ropes; and, in several layers and groups, by their uniform, coördinated action, sustain the spine in place, or move it about in any required direction in the most symmetrical and perfect manner. Excepting the slight curvature, forward in the lumbar, and backward in the dorsal regions, the position of the spine and shape of the spinal column at any moment, in health, depend on the muscles. When the muscles act in harmony—the different groups being properly set-off by their respective antagonists—then the spinal column, whether at rest or in motion, is always where it should be. But, if the action of certain muscles is not properly antagonized, but some muscles do not act with the same degree of force as their mates, then this harmony and coördination are lost, and the spine makes a greater flexion towards the point where is the stronger muscular action, if this action is in the transverse direction, as of the scapular muscles acting at the *middle* of the flexible column; but *from* the stronger muscular force, when acting from one side at the *ends* of the flexible column longitudinally. That is, this unequal muscular action may cause the spine to deviate to the right or left, to or from the stronger muscles, according as they may happen to be, those that act longitudinally or transversely.

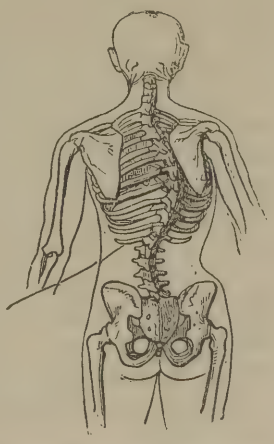
§ 86. We have thus a deviation from the normal direction of the column; or, what is called a *curvature* of the spine. This deviation from the proper direction may occur anywhere in its length, but is most liable to occur at the upper extremity; which liability rapidly decreases from above downwards. A forward inclination of the neck, in consequence of the greater

weakness of the dorsal and cervical muscles—often brought about by the excessive strain, to which these muscles are subjected by bad positions in study and various avocations—is the most common deformity to be met with. This makes one stoop-necked, round-shouldered, &c. But this condition, though a real deformity, and a great detriment to personal appearance, yet is so common, and causes so little physical inconvenience, that it is generally over-looked or ignored, or is erroneously considered a natural defect. The latter opinion is a mistake. It is really a deformity, produced in the way above-mentioned, and should be the subject of medical treatment.

§ 87. The next most frequent curvature of the spine is in the dorsal region, and is caused by the unequal action of antagonistic muscles at *each side* of the spine and of a trunk; the deviation and bending being towards one side—most frequently, by far, to the right. This deformity—viz.: lateral curvature to the right—will be considered in this paper.

Why it is that, in lateral curvature, the deviation is more frequently to the right (it has been stated to happen three times in every four), is probably partly explained by the fact that the right arm is used the most, and is consequently stronger than the left, especially about the scapular muscular attachments. But it has been suggested that the right lung, being the larger, may have some predisposing influence; but faulty positions in sitting, standing, and at the writing or study desk increase this tendency to a great degree. However, the treatment for the one, reversed, would be the treatment for the other, and the reader will bear in mind that I speak of the curvature to the *right*. Fig. XXIX. is an excellent illustration of the most common form of lateral curvature. It presents, as will be seen, a double or *sigmoid* incurvation, with the principal and primary curve in the middle of the dorsal region, to the right, and a

Fig. XXIX.



Sigmoid curvature of the spine to the right.

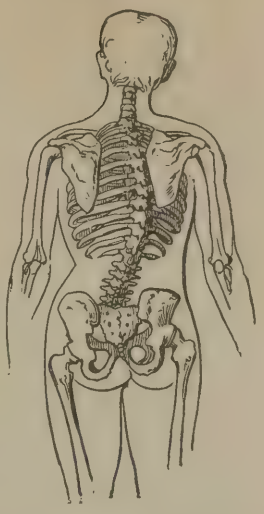
smaller secondary curve in the lumber region, to the left. There is also another secondary curve in the cervical region. These latter curves are in consequence of, and for the most part are dependant on the principal primary curve in the middle of the back. Here is where the evil generally first commences, and to this part must our treatment, to be successful, be principally directed; because the curves above and below, being dependant on this first and largest curve, will be restored at the same time and in the same proportion with it.

§ 88. By examining the cut, which very truly represents these cases, the spine is seen crowding up and under the right shoulder-blade, making that shoulder higher and more projecting than natural; and the ribs behind, on the right side, make a shorter bend, while on the left side they are much straightened and turn downwards, and the shoulder-blade of that side is lower and less prominent than natural. Many people think that this difference in the appearance of the shoulders is owing to some disparity in the shoulders themselves; but this is never the case. The shoulders are really alike, and any difference in *appearance* is always owing to a deviation of the spine in that region towards one side, and medical aid should immediately be sought before the curvature becomes fixed and irreparable. Again, many suppose that one—as the right—hip is larger or higher than the other, when this difference is only apparent; the incurvation of the dorsal spine towards the left side draws in the body-line on the right side (Fig. XXIX.) leaving the right hip prominent, and making on acute angle and deep indentation over the hip on that side; while, on the left side the body-line is straightened, and the natural angle of the body-line nearly or quite obliterated. This obscures the left hip, making it less prominent, as it is partly hid in the tissues. Although habitual standing on one foot, as will be presently shown, favors the formation of a curvature, still it is difficult to see how one hip can really be higher than the other while standing on both feet, unless there be a difference in the length of the legs.

§ 89. There is another species of lateral curvature, differing

somewhat from that just described and is seen represented in Fig. XXX.

Fig. XXX.



Crescentic curvature of the spine to the right.

This, for the sake of distinction, may be called the *crescentic* form. In this form the spine takes a single sweep in one direction, and without the *compensating* curves towards the opposite side, above and below. The only reason that I can assign for this is the fact, that, in the crescentic curvature, the point of greatest deviation is much *below* what it is in the common sigmoid variety; and probably there is too little room for a compensating curvature in an opposite direction in the lumber region and no necessity for it above. This seems to be a sufficient explanation. The appearance of the shoulders is not much altered—not generally so much as shown in the cut; but the hip is prominent on the *opposite* side from the curvature, instead of on the *same* side, in as in the sigmoid variety, in consequence of the angle of the body-line on that side being increased and diminished on the same side of the curvature. In this respect it is the *opposite* of the common sigmoid curvature. This should be borne in mind, or else it may lead to serious mistakes in diagnosis. The crescentic variety is much less frequently met with than the other kind; it is probably as frequent on one side as the other, and, in my experience, is much more difficult to treat, it being so low down that muscular action can influence it in only a few directions. However, the same principles are to be observed in the treatment in both cases.

§ 90. General muscular weakness in a young person renders such liable to spinal distortion, though this weakness be not at first accompanied by unequal action of the muscles. But, while this delicacy exists, any little faults of position or carriage, in sitting, lying, or walking, may subject certain groups of muscles to what is to them, in their weak condition, excessive fatigue or strain. Now, if this disproportionate fatigue of certain

groups of muscles be kept up a certain length of time, the unequal action of the muscles becomes habitual and fixed, and we have the spinal column deviating from its proper direction in obedience to the force acting upon it. The most favorable situation for a young person to acquire the deformity under consideration, seems to be among the inmatesof our popular boarding-schools, and it is notorious how many young ladies are thus afflicted. The hard, exhausting study, little proper exercise, faulty positions at desk, high bolsters, and much else that might be pointed out, if the subject were entered into, all conspire to induce this deformity; and, considering such special provisions made for it, the only wonder is that so many actually escape.

§ 91. Weak ankles, often the result of the ungraceful and in other respects pernicious fashion of wearing high, narrow-heeled shoes, straining the ankle by rolling about, &c., may be a cause of lateral curvature of the spine. The weaker ankle is generally the left, and the individual soon forms the habit of standing on the right foot. Fig. XXXI. shows the effect of persistence in this habit. The lower portion of the spine is thrown to the *left*, and the dorsal portion necessarily thrown to the *right*. This does no harm in strong persons; but in the weak, certain muscles are subjected to great fatigue, by which they are rendered disproportionally feeble. The muscles subjected to the extra strain are those on the *right* side of the dorsal region (see Fig. XXIX.) or on the *convexity* of the distortion.

Fig. XXXI.

Unequal muscular fatigue and consequent curvature caused by habitual standing on one foot; see Fig. XXXII.

§ 92. But, as before intimated (§ 85), *weakness* is not always or necessarily a concomitant of this deformity. It may exists in persons of both sexes who are muscularly strong. It is caused in these cases still by unequal action of coördinate muscles, but produced by *over*-action of some muscles in some regions, as the first is produced by *under*-action of the opposite and antagonistic groups; in either case, the balance is destroyed. Every one is familiar with the causes capable of producing strabismus, talipes, &c., For some unexplained cause, some muscles seem to take on a

species of tetanic action, and after a time become shortened or retracted, and fixed.

Strabismus is most frequently the result of disordered digestion, and I have generally found that lateral curvature of the spine in strong persons, had followed a long period of dyspepsia or other phase of disordered digestion. Unequal muscular action from this cause no doubt exists in all parts of the body; but, acting against the end of a single inflexible bone, no deformity can occur; while, in the case of the spinal column, a deformity must exist whenever the conditions previously described are found.

§ 93. But, given the deformity, what shall be the treatment? Shall we tie up all the muscles, and still further increase their weakness and irritation by wearing a "supporter?" Shall we ignore the physiological relations of the different parts, and use an apparatus that acts upon the trunk as a whole, and by screws and braces straighten it out as we would a crooked stick? There is a better way. It is very simple, and consists of *reversing* the same process that first produced the distortion. For curvature to the *right*, we must establish the conditions for causing a curvature to the *left*, and continue the process till it is brought back to the proper position and there stop.

§ 94. In this deformity, the two conditions of retraction and relaxation (§ 20) exist in the muscles acting longitudinally, respectively in relation to the concave and convex sides of the spinal column; and our effort must be directed in accordance with these conditions; and by using eccentric movements (§ 20) on the concave side to expand the retracted muscles, and concentric movements on the convex side to contract and increase the po werof the expanded muscles on the convex side—acting in the direction of this relaxation—we use the proper means to overcome the deformity. But it requires the nicest discrimination to so adapt a movement that the right muscles will be affected in the right way, or else we may do harm instead of good. For instance, it was stated that a curvature may be produced by stronger action of the muscles of the right side. But this stronger action must come in a transverse direction—as the scapular muscles—while those muscles acting longitudinally, as the inter-coltales, erector-spinæ, &c., are expanded, lengthened,

and weakened by the bulging out of the convexity of the curvature; while too great action of those muscles acting longitudinally would act like a string to a bow, and produce the curvature to the left, as is often the case. Our effort must be, then, by placing the patient in such positions and using such movements that these several different actions will be produced on different sections and opposite sides of the spine at the same time. (See Fig. XXIX.)

FIG. XXXII. § 95. We find, almost without exception, in curvature to the *right*, that the *left ankle* (§ 91) is very much weaker than the other. Movements like that shown in Fig. VIII. must be employed, together with inward and outward flexion, twisting the whole leg from the hip, in the same position, and many others calculated to strengthen the left leg and ankle.

Restoring equal muscular action and reducing curvature by standing on left foot and stretching up left hand. See FIG. XXXI.

The position shown in Fig. XXXII. increases the strength of the left leg and ankle, and, at the same time, the lower part of the spine is thrown to the right, while the upper or dorsal portion is powerfully drawn to the left, by the position of the left arm. (See Fig. XXXI.) The patient makes a strong effort to *reach up*, and remains in that state a certain length of time; if possible, a minute. It will be seen how, in this movement, the left side of the spine in the upper part is expanded, and in the lower part contracted; while on the right side the upper portion is contracted and the lower portion expanded; all of which tends to unbend and straighten the S.

Fig. XXXIII. represents one method of causing the action of the spinal muscles to aid in producing the desired result. The patient, with the left arm stretched up, leans over a bar, with his thighs resting against it, while the assistant grasps the left wrist, and presses upon the right shoulder. The patient now slowly raises the trunk from *a* to *b*. By the assistant's pulling at the left arm, the long leverage causes the scapular muscles attached to the spine—the lower portion of the trapezius, rhomboidii, &c.,—to act powerfully in drawing that part of the spine to the left, while the pressure of the hand upon the right shoulder

still further aids this action. The spinal muscles act the same as described in the previous illustration; eccentric and concentric, on alternate sections and opposite sides of the spine. This latter result is still better secured if the right foot is carried away a little to the right, so that the principal weight of the body will fall on the left leg.

The movement represented in Fig. XXXIV. secures all of the actions previously enumerated, and is especially powerful in drawing the spine towards the left. The patient stands with the right foot carried a short distance away from the other, so that the weight of the body is sustained principally by the left leg; he then takes hold of the pin, at the height of the shoulder, with the left hand only, and then settles down, as seen at *a*. He now slowly draws himself up, against the resistance of the assistant—who holds him by the hips as seen—to *b* and finally to *c*, in contact with the pin-post.

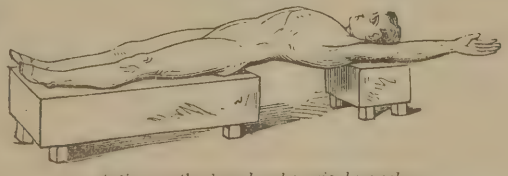
Fig. XXXIV.

United action of scapular and spinal muscles to force the spine into its place.

Fig. XXXIII.

Acting concentrically on scapular muscles and eccentrically on longitudinal muscles of left side.

Fig. XXXV.



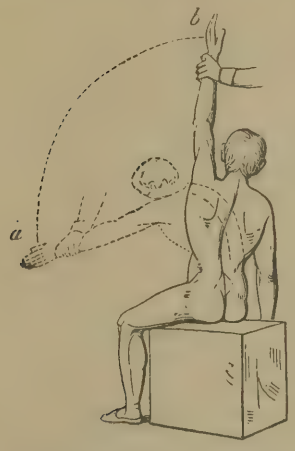
Acting on the dorsal and cervical muscles.

Fig. XXXV. represents the patient with only the legs, hips, and head supported, the whole trunk being held up by the action of the spinal muscles. The position of the left arm, which is stretched up, with the action of the spinal muscles, acts powerfully to bring the spine in place; and if, at the same time, traction

be made at the *left* arm and *right* foot, by assistants, the effect will be still more to straighten the spine. The muscles of the back of the neck and upper part of the back are particularly affected.

§ 96. The movements just shown are such as act more or less along the whole length of the spine, and are so contrived that their action is eccentric and concentric at different portions and opposite sides of the spine, as the muscles in the different sections are retracted or relaxed; the whole of which concerted action tends to restore the spine to its normal position. But, as previously stated (§ 87), the primary curve is in the dorsal region, and the incurvation above and below in the opposite direction are secondary or compensating curves, which must recede as the original curvature is straightened out. Our main efforts, then, must be to reduce this curvature, which projects and pushes up the right shoulder.

Fig. XXXVI.



Concentric contraction of muscles on the upper portion of right side, from left and right.

Fig. XXXVI. shows the patient sitting with knees wide apart, the left arm stretched up, and the trunk bent forward well to the left, as shown by the dotted lines at *a*. His thighs should be firmly held by one or two assistants. The patient now slowly raises the arm and trunk, from *a* to *b*, into the upright position, while an assistant, having hold of his wrist, increases the force by making resistance. It is a powerful movement. The muscular action is a concentric contraction from left to right over the convexity of the curvature, in the direction of the dotted lines. This shows how to contract the right side; the next figure (Fig. XXXVII.) shows how to expand the left side.

Fig. XXXVII.

Expansion of left side.

§ 97. The patient hangs by the *left* hand to a pole; not perpendicularly, for the trunk is pushed to the left by resting at a point opposite the greatest concavity, against a padded bar. Thus there is secured a double action; viz.: a powerful expansion (eccentric) of the concavity, aided by the mechanical pushing force caused by the weight of the body against the bar. The weight of the body below the bar, and the muscular force of the left side and arm above it, make the fulcrum in the spine opposite the bar, which force above and below acts towards the right. The patient touches his toes or swings clear, and the bar is moved to the left or right according to the patient's strength, and as we wish to regulate the force of the movement. The patient remains in that position while be can without discomfort.

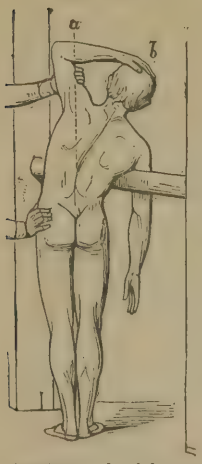
The movement represented in Fig. XXXVIII. acts in such a manner that the muscles on the *right* side of the upper portion of the spine are contracted. The patient stands erect (*a*), with the left hand resting on the top of the head, and the right hand on the back of the neck, to have the right shoulder the lower, and with the *left* hip against the bar, as shown. The assistant then places his hand opposite, or just below the greatest incurvation of the spine, and holds very firmly against it, while the patient bends the trunk to the right (from *a* to *b*) against strong resistance. Care must be taken that the patient does not bend either knee, especially the right knee—which he will be very much inclined to do—for that would make the effect very different, by varying the muscular action. With the legs and feet firm, the hips unable to glide to the left on account of the bar, the firm resistance of the assistant's hand opposite the apex of the curvature, it has the effect of preventing contractions below that point,—cutting off the lower part of the body, as it were,—so that the patient's force is confined to, and expended on these muscles (erector spinæ intercostales, &c.),

Fig. XXXVIII.

Contraction on right side above the hand.

the contraction of which forces the spine to the left, and expands the left side, at the same time that this action is aided by the mechanical pressure of the hand. The spine is literally unbent. About the same thing is accomplished, in a little different manner, by the movement shown in the next illustration (Fig. XXIX.)

Fig. XXIX.

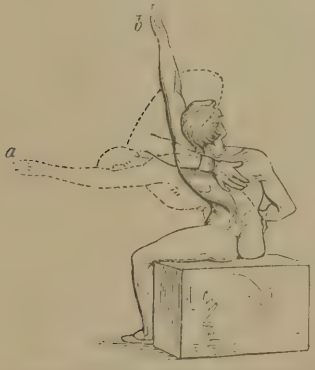


Bending to the right over the bar, contracting the right and expanding the left side.

Here the hip is held from moving to the left by one hand of the assistant, while the bar is opposite the curvature. The patient then bends over the bar to the right (from *a* to *b*), while the assistant, with the other hand, increases the force by pulling down upon the left arm. The hip should be firmly held, and the patient not allowed to rise on the toes.

§ 98. A lateral curvature to the right, is always accompanied with a horizontal *twist* of the spine on its axis to the left. The long diameter of the elipse formed by a transverse section through the chest, which should be from side to side, is now from behind right to forwards left, with corresponding depressions on the right side in front and left side behind. And the whole appearance is often strikingly impaired by this twisting of the trunk.

Fig. XL.



A combined raising, twisting to the right, and backwards flexion.

Fig. XL. represents a movement calculated to remedy this defect. The patient, firmly seated on a bench, with the knees apart, and with the left arm stretched up, bends the body forward and to the left, at the same time *twisting* still more to the left, as much as possible. The assistant's hand pressed strongly upon the right shoulder, while the patient rises slowly to the erect posture, at the same time twisting the right shoulder back and towards the right, and so he

continues to twist against the resisting hand, and finally bends backward and to the left again as far as possible. The motion is continuous from first to last, without stopping, following the direction of the dotted lines. The legs should be held firmly down by one or two assistants. This movement requires much skill to properly execute, but when well done is an excellent one for the purpose intended.

§ 99. Thus I have given what I believe is the true pathology of lateral curvature of the spine, and have shown how to meet the case by appropriate treatment; a treatment that answers both the physiological and mechanical indications of the case. But it has been impossible to explain more than a few movements, out of a multitude that are used, and these such simple ones as could be best illustrated by wood-cuts. All the conditions of the patient's health should be taken into consideration in making a prescription of movements for this deformity, and the particular movements for different cases will vary accordingly. But, with tolerable general health and the case not too long standing—say from a few months to one or two years—and I believe nearly all cases can be permanently cured. Indeed, I believe that there is no necessity for such a vast number of our women having this deformity. It is treated too lightly at first, till it becomes too formidable at last. We can do almost anything with the muscles,—can mould them at our will; but when the spinal *bones* have become fixed in an altered shape, the changing of the direction of the spinal column becomes a more difficult matter. The weak muscles are still weaker from long continued strain or inaction, and the rigid spine is a constant counteraction to their development. But the greatest difficulty in these long-standing cases exists in the altered shape of the vertebræ themselves—their conversion from symmetrical into wedge-shaped blocks, by the great pressure on the concave side of the incurvation. Both the inte-vertebral substance and the vertebræ are sometimes pressed to sharp edges by this constant force exerted on one side; and a stiffening, and hardening of the column take place as years advance.

Fig. XLI.

Section of spinal column, showing the wedge-shaped form of vertebræ in long-standing lateral curvature.

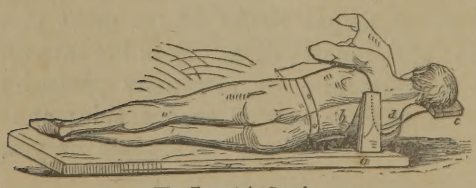
Fig. XLI. is a very good illustration of a section of the spine after the curvature has existed for years.

§ 100. In recent cases, *while the spinal column is yet pliable*, the muscles can readily bring it to its proper position. And at any stage they will do all that can be done to accomplish this result. The wearing of "supporters" is much worse than useless. Most of them are wholly inefficient to act, in any proper manner, on the osseous column, while they are amply sufficient to increase the muscular weakness which is the original cause of the deformity. The instrument made by Tamplin of London, or some modification of it, seems to be the most sensible, for that does aim to act on the spine in an efficient manner; but, like all others that I have seen, or that must be worn on the person, it *holds up* the trunk, and thus weakens the muscles by preventing their action. In the long run, they are always bad. I need not argue this point, for this is the general opinion of the profession at the present day.

§ 101. I have contrived a plan by which the patient can have a *continuous* movement, which will act for a considerable time on the vertebral column to crowd it mechanically into place, and at the same time to expand the muscles of the contracted side. On the spinal column, the action is to force apart the narrow edges, and to press together the wide edges, of the vertebræ, and hold them there for any desired length of time, thus reversing the side of the spine on which this pressure from the curvature has been greatest.

Fig. XLII. represents a contrivance by which this combined and continued movement may be taken, and which I have named the "eccentric couch." It consists simply of a flat cushioned bench (*a*), with two posts, about thirteen inches high, three wide, and one foot apart, as seen in the

Fig. XLII.



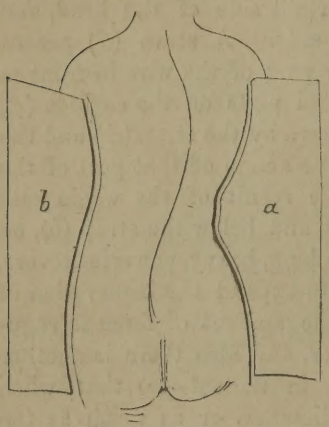
The Eccentric Couch.

cut. From the tops of these posts is suspended a strap (*b*), made to buckle at one end, so that it can be brought close to the cushion or drawn high up. The patient lies down upon the couch, on the right side (in curvature to the right), with the body resting on the strap (which is cushioned) at a point opposite the greatest incurvation, generally under the right shoulder. But the most important part of the contrivance is now to be described. A wire (well padded) passes under the left arm, across the chest, before and behind to the right shoulder; then turning upward passes to the right side of the head, and under it as he lies on the right side. A strap (*d*) passes over the right shoulder, from the part of the wire in front to that behind; so that, when the head rests on the cushion (*c*), the right shoulder will be pressed down by the strap (*d*) and the left side lifted up or expanded by the action of that part of the instrument under the left arm. The result of the whole contrivance is to divide the body above and below the strap (*b*), on which it rests as a fulcrum, into two long, heavy, powerful levers, both acting in such a manner as to expand the incurvation of the spinal column at that point. The amount of force is regulated as the strap is higher or lower, and also there is another adjustible contrivance—not shown in the cut—so that, when the head has descended a desired distance, or as much as the patient can bear, it rests upon a support, and the spine is there made to retain this straightened-out position as long as is required. As before stated, this is really a continuous movement, but it is such a one as the patient can assume at home at convenient periods during the day, and there is no danger of doing it wrong. It should not be made irksome—and it is so adjustible that it need not be—but is capable of acting with tremendous power. For these long-standing cases, as a part of the treatment, this contrivance is of vast utility.

§ 102. This subject would not be complete without a description of the proper method of making a correct and reliable measurement of the extent of the deformity. The method usually adopted of marking the course of the spine, I believe to be wholly unreliable and untrustworthy, for the reason that it is practically impossible, in the majority of cases, to know exactly where the spine is. Unless the patient is very thin in flesh, the

spine is hidden deep in the tissues, at least in a part of its course, and this obscurity is increased by the twisting and bending of the deformity. A better way is to get the body-lines, by laying a strip of lead along each side, from the axilla to the trochanter, and then carefully laying it off, and marking on a piece of paste-board, which can then be cut into the same shape or pattern of the side. Thus each side is fitted, as seen in Fig. XLIII., which is from an actual case.

FIG. XLIII.



Taking the pattern (a and b) of the body-lines as the measure of the deformity.

Now, as the variations of the body-lines from the symmetrical form are caused by the spinal distortion, so any return of the spinal column to its normal position will be exactly marked by the variations of the body-lines towards the natural symmetry. By only applying the paste-board patterns (*a* and *b*) to the patient's sides, a moment is sufficient to tell exactly how much the patient has improved. I usually take another similar pattern over the most projecting part of the back. The height should also be taken, straightening out of the spinal column progresses.